The Electrical Industry's Weekly Magazine

April 22, 1957

Electrical World

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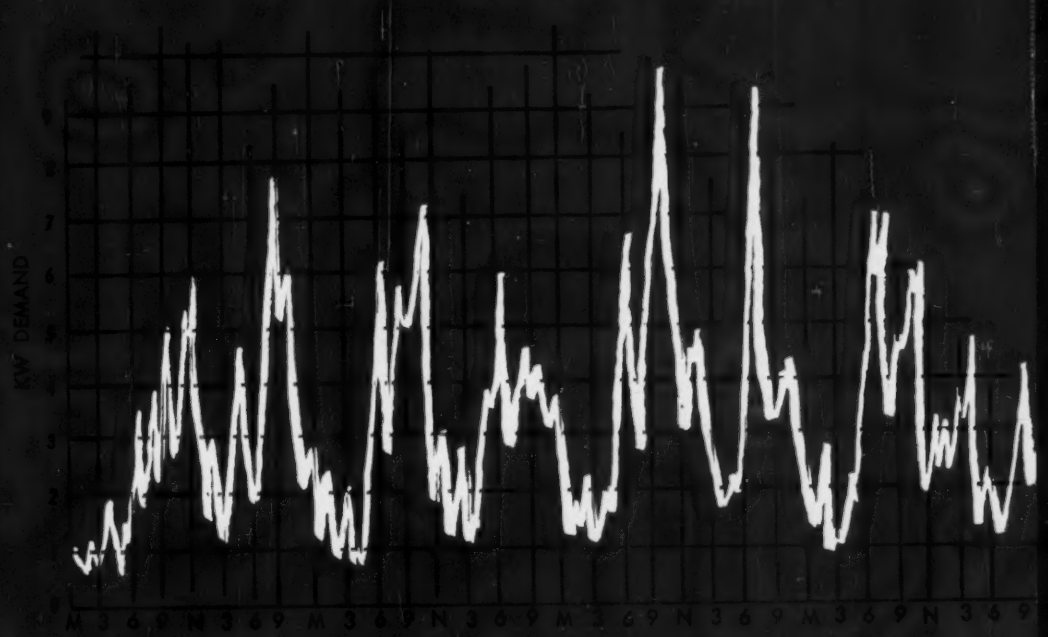

Demand Studies Show:

How to Save Transformer Capacity

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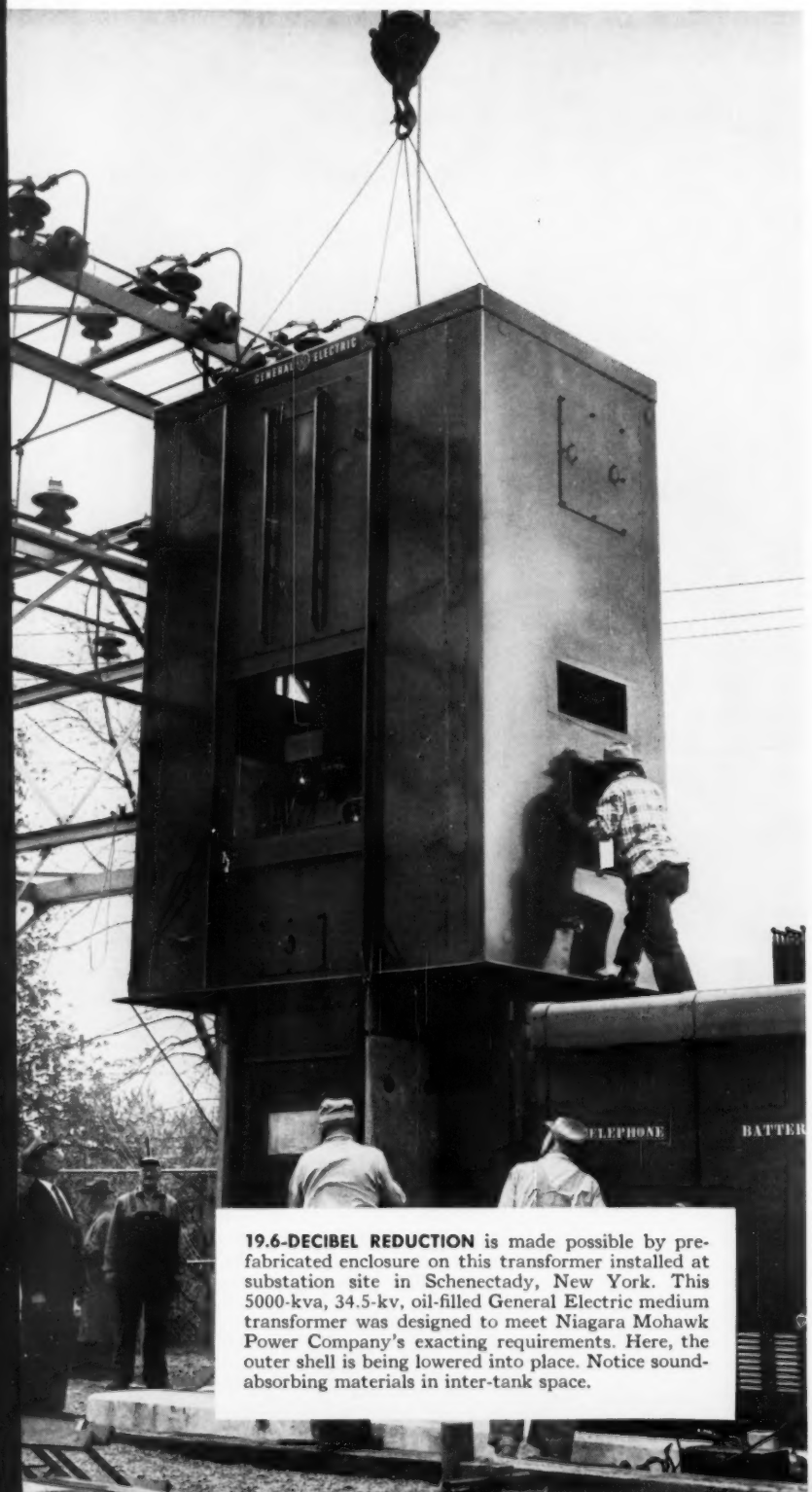
EEI Sales Conference Highlights Industry Potential . . . Page 45

E B POWER GS W
UNIVERSITY MICROFILMS I
313 N 1 ST
ANN ARBOR MICH

New transformer development helps break down the "sound barrier" to good public relations



19.6-DECIBEL REDUCTION is made possible by prefabricated enclosure on this transformer installed at substation site in Schenectady, New York. This 5000-kva, 34.5-kv, oil-filled General Electric medium transformer was designed to meet Niagara Mohawk Power Company's exacting requirements. Here, the outer shell is being lowered into place. Notice sound-absorbing materials in inter-tank space.

Transformer hum in residential substations has long been a problem only partially resolved by the selection of a somewhat isolated site, construction of sound barriers, or use of a low-sound transformer. The first two solutions are often impractical or far too costly, leaving the third, which is satisfactory for small reductions in sound.

QUIET TRANSFORMERS

However, a significant development has recently been achieved by General Electric engineers working at the Company's Rome, Georgia Transformer plant. It consists of a transformer in a prefabricated sound enclosure with separately banked radiators. With today's core-and-coil designs, this development enables economical sound reductions of 10 to 20 decibels. This was made possible through the research conducted by transformer development engineers at the General Electric Sound Laboratory at Pittsfield, Mass. Valuable data was also gathered by studying the performance of one-seventh scale models of transformers in the anechoic chamber.

NOW AVAILABLE

Traditionally, transformer sound reductions of more than a few decibels has been a utility problem involving costly substation sound barriers. This developmental step forward in reducing transformer hum can change that picture. Utilities are now urged to seriously consider this advantage when confronted with the necessity of installing power transformers in congested residential areas. For more information contact your General Electric Apparatus Sales Office. General Electric Co., Schenectady 5, N.Y.

301-352

LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

GENERAL ELECTRIC

Electrical World

Vol. 147, No. 16 APRIL 22, 1957

Published for 83 years for those engaged in the business of generating, transmitting, distributing or applying electric power

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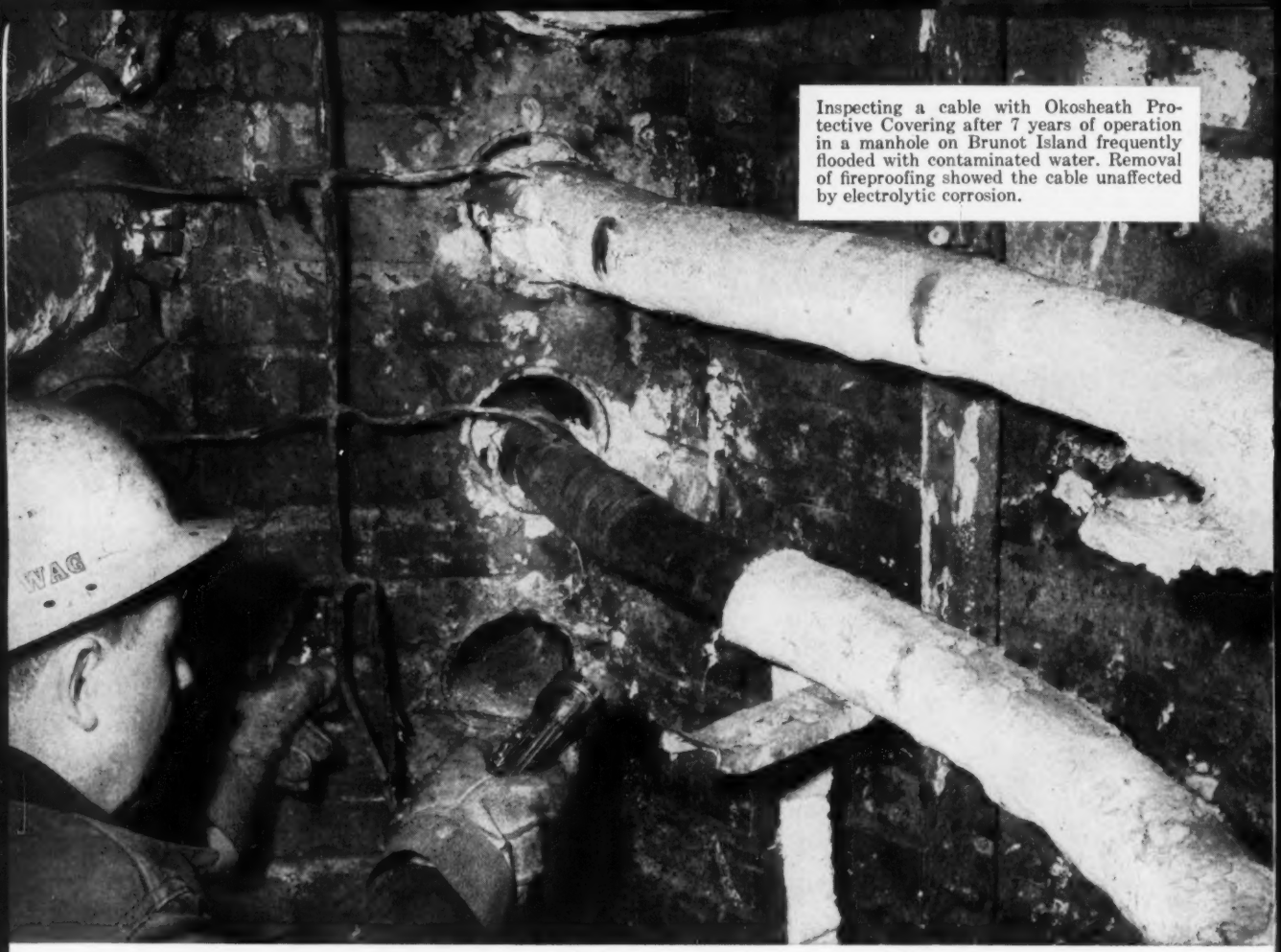

Inspecting a cable with Okosheath Protective Covering after 7 years of operation in a manhole on Brunot Island frequently flooded with contaminated water. Removal of fireproofing showed the cable unaffected by electrolytic corrosion.

How Duquesne Light Company solved lead-sheath corrosion

Duquesne's Pittsburgh generating station on Brunot Island in the Ohio River had long been plagued with cable failure due to electrolytic corrosion of lead sheaths. River and rain water seepage through cinder fill caused this electrolytic action. Since it was impossible to do away with the cinder fill, the only solution was a cable not vulnerable to corrosion. Okosheath Protective Covering supplied the answer. When bonded by vulcanization to an Okometal alloyed lead sheath, this tough jacket of reinforced Okoprene provides a dual-sheath protection that prevents chemical and electrolytic corrosion and possesses greater fatigue resistance than plain lead sheath. So pleased was Duquesne that existing cables for the 50 distribution circuits originating on the Island were pulled out and replaced with protective sheath cable—30,000 feet in all. A large part of this had Okometal Sheath with Okosheath Protective Covering.

Since completion of the change to protective sheath cable, there has not been a single cable failure due to electrolytic corrosion despite the fact that water and acids are always present in the manholes and duct system. Duquesne considers their problem to be completely solved and are quite enthusiastic about the installation. This is understandable when you consider that several regular lead-sheath cables failed at this location after only a short duration.

Okometal-Okosheath cable can double the life expectancy of plain lead-sheathed cables. Why not let your Okonite representative give you full details on this type of cable. Write today to The Okonite Company, Passaic, New Jersey. 4989

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. . . *from the publisher*

One of our subscribers recently asked, "What's the toughest thing you run up against in turning out your magazine?" My answer: "You, the reader."

Electrical World readers are experts. They know their field. They're sophisticated and exacting. Unlike readers of general "consumer" magazines, they know fundamentally as much or more about the subject matter as the man who is writing it.

Thus, an Electrical World editor must have a grasp of more than just how to put words on paper. He must know the business he's writing about.

How well do EW staffers fill this bill? If experience means anything, they fill it very well. All but three of our 24 editors have held jobs in the electrical industry before coming to the magazine. The utilities many of them once called home could fill an association roster. Among them: New York State Electric & Gas, Duquesne Light, Alabama Power, Seattle City Light, Public Service Co of Colorado, Electric Power Board of Chattanooga, Appalachian Electric Power, Utah Power & Light, West Penn Electric, Commonwealth Edison, Potomac Electric Power, Nantahala Power & Light, and Consolidated Edison.

It was good company these editors kept.

Fischer Black

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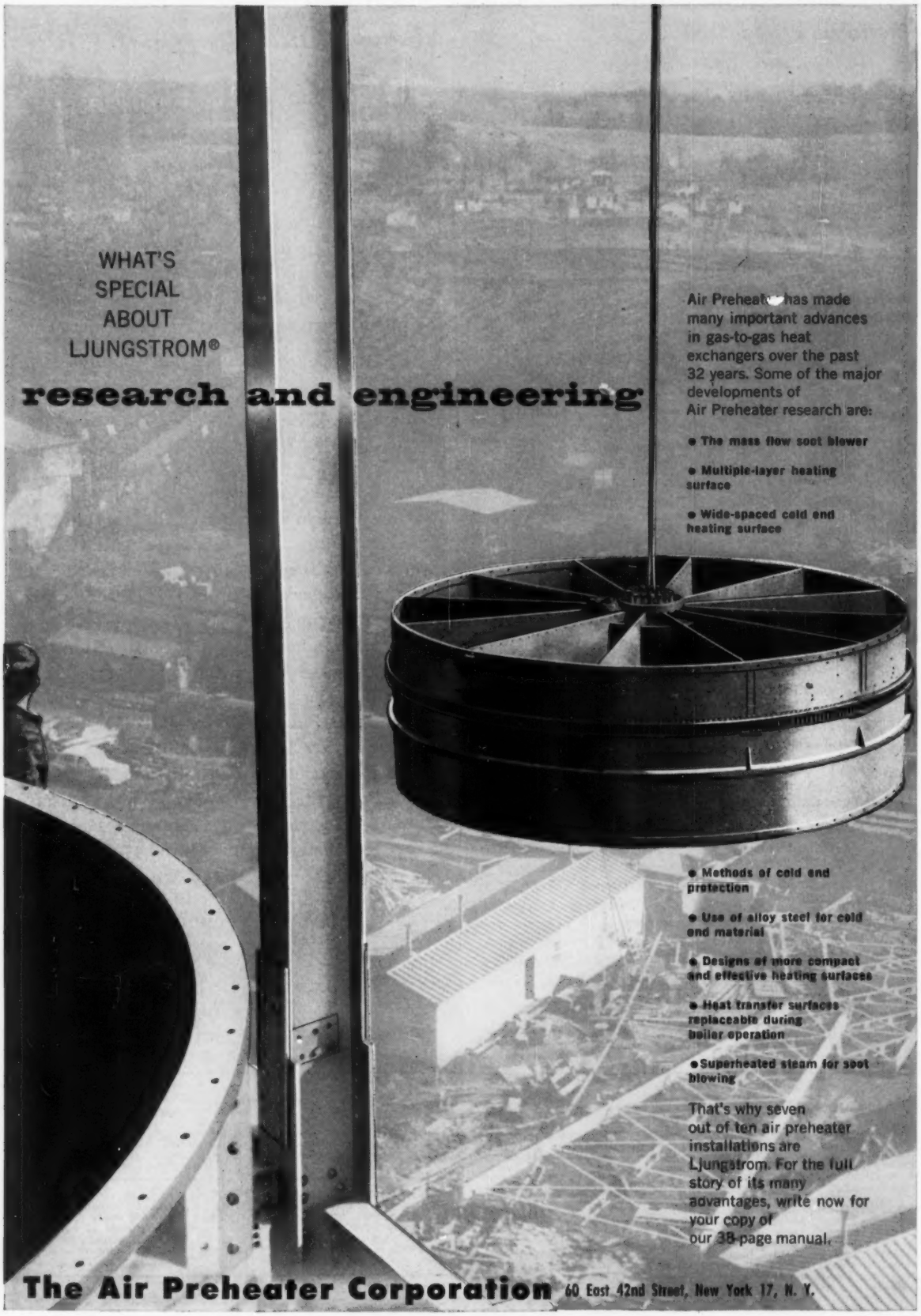
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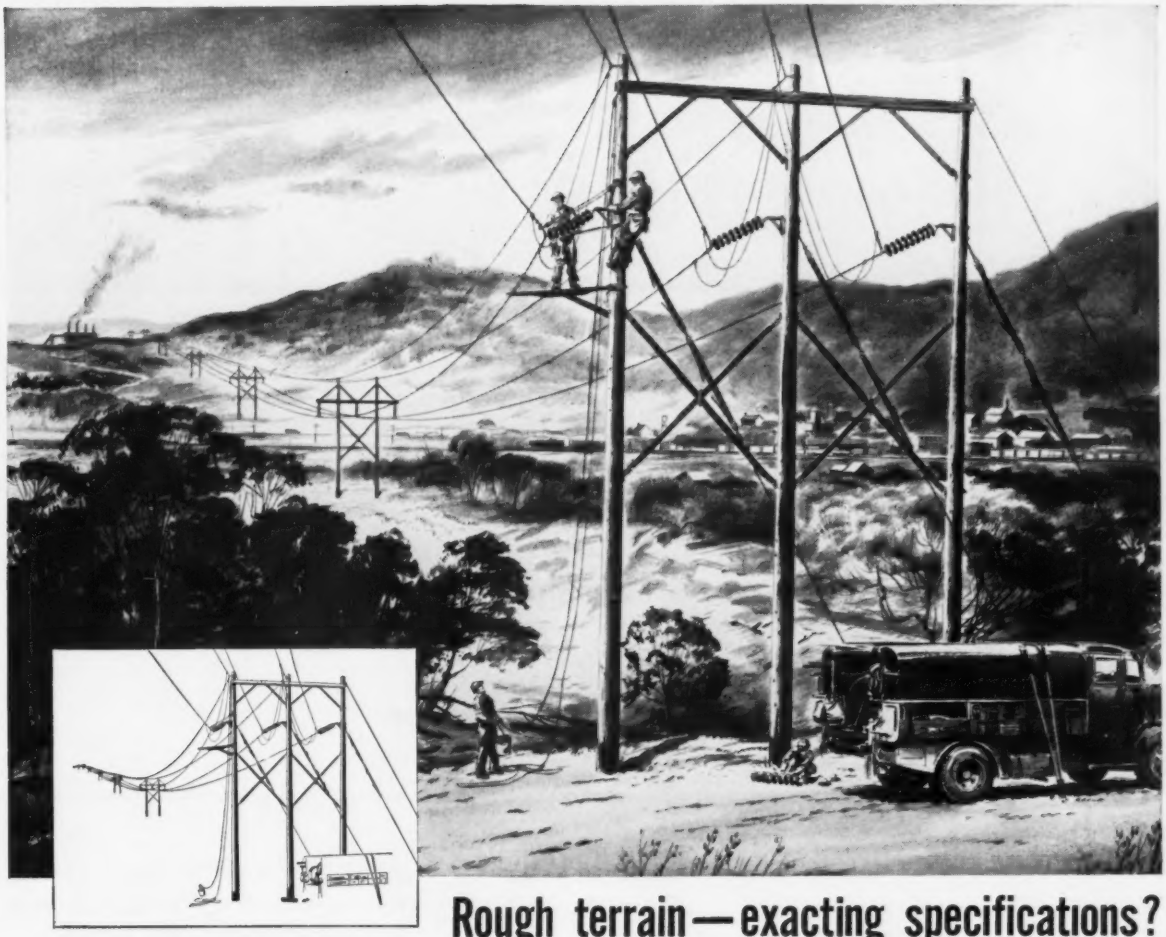

You can get prompt help with any outside construction problem through your Graybar office. In over 130 cities there are Graybar offices and warehouses ready to fill your every need for line materials, hardware and tools. And through any of these offices you can get the help of Graybar Outside Construction Specialists, strategically located in 19 principal cities, equipped by training and experience to give you prompt, dependable help.

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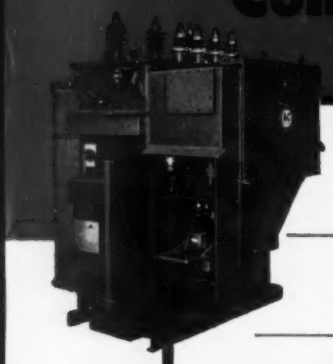
How regulators

Compare cost of LTC transformers



LTC on transformer with ±10% regulation	$12,287
3 Distribution regulators with conventional +10% −10% regulation	$11,670
3 Distribution regulators provide +10% −5% system regulation using *VARI-AMP*	$ 7,572
Maximum savings (using *VARI-AMP*)	$ 4,715

Here are the four steps needed to make this comparison:

1. **Select substation size.**
2. **Determine percent regulation required.**
3. **Select proper size regulating unit based either on current or kva, and range of regulation required.**
4. **Compare cost of LTC portion of transformer and 3 Allis-Chalmers distribution regulators.**

In this example, the substation size is 3750 kva, 164 amperes, 13,200 volts, self-cooled. Regulation required is +10% −5%.

Key to Savings is unequal range of regulation using Vari-Amp

Regulators or LTC could be provided for ±10% regulation. But there's a money saving way using *Vari-Amp* where less than ±20% regulation is required.

In this case, regulation needs are figured either on basis of setting permanent taps of transformer up 5%, or using an alternate voltage on low voltage winding to provide a 5% boost. Then only a 5% raise from the regulator is needed. The transformer raises voltage 5%; regulator raises voltage 5% . . . a net raise of 10%.

This requires regulators to carry 3750 through kva or 164 amperes at the 5% *Vari-Amp* position.

On minimum load the transformer raises voltage 5%, regulator lowers voltage 10%, which gives a net result of −5%. The regulator is allowed to go to −10% because load current has dropped below the 10% current rating of the regulator.

The selection: regulators rated 76.2 kva, 7620 volts, 160 amperes. Comparing costs shows a saving of $4715 using Allis-Chalmers distribution regulators with *Vari-Amp*.

See what you can save! Get a bid on A-C regulators next time you figure a substation. Ask your nearby A-C office for Key to Low Cost Regulation, No. A-5307, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

save $4715

and regulators

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Allis-Chalmers
Originators of:

- 5/8% Step Regulators
- Unit Construction
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4-Point Advantage

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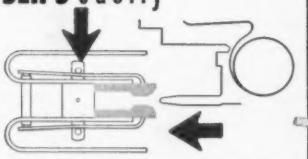
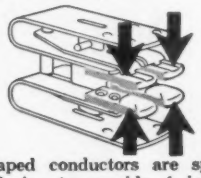


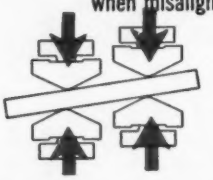
Tension bar and spacer prestresses contacts and reduces necessary force required to close contacts (effort at switch handle). Narrow convex silver-clad contact surfaces plow away any dirt from silver-nickel insert on blade tongue.

GRIPS at 4 points... not 2



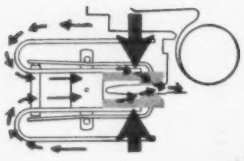
U-shaped conductors are split lengthwise to provide 4 independently sprung contact fingers. The pressure is applied to each by a flat beryllium copper loading spring.

GRIPS at 4 points... even when misaligned



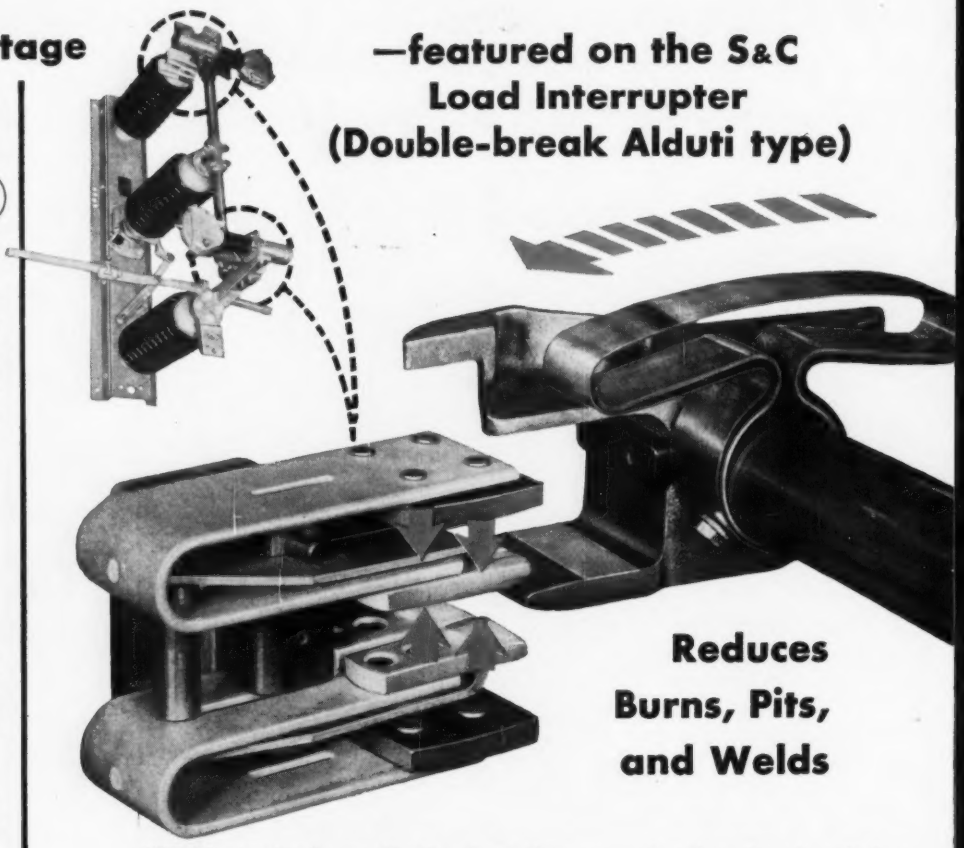
For 2 reasons: (1) Pressure is applied independently by springs in 3-point suspension which can rock and roll; and (2) pressure is applied equally on either side of blade by tension bar.

GRIPS harder... but only when needed



The reverse loop construction provides a magnetic field pattern during short-circuit current flow that causes repulsion and attraction forces to combine to produce heavier contact pressure when you need it.

—featured on the S&C Load Interrupter (Double-break Alduti type)



Reduces Burns, Pits, and Welds

NEMA standards specify the short-time current ratings for air switches and interrupter switches. And it is natural that equipment can be built to meet these requirements when new.

The big "if" is what happens in service.

You have found from experience that switches with conventional contacts must be carefully installed, and then continually maintained if they are to retain their original NEMA short-time ratings. As a practical matter such equipment generally gets little maintenance, and the short-time current capacity falls off.

You want a contact that meets NEMA standards after being in service, in spite of some misalignment in installation, and in spite of little maintenance. The Double-break Alduti has such a contact.

No more expensive contact maintenance work in the shop, dressing off burns and pits. No more worry about contacts welded shut after a momentary short-circuit loading. And the magneto-motive effect through the U-shaped contacts provides extra contact pressure when it is needed.

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NEWS-SCOPE

FUTURE NEWS ▶ **Electric heating of schools becomes more attractive.** Reasons: Prices of coal and oil are advancing faster than price of electricity. Building costs which are also going up would be reduced. Load is off-peak.

Despite stepped up research efforts, nuclear fusion remains long-range possibility as heat source for power generation. Utility executives think it has excellent potential but will not slow work on harnessing nuclear fission.

New tax reporting method cuts paper work. Other utilities are sure to follow Con Edison's lead in filing quarterly tax reports on magnetic tape from its IBM 705 computer rather than the endless paper forms. Treasury Department has approved method for reports on Con Ed's 26,000 employees.

LATE NEWS ▶ **An investigation of electric company advertising in connection with tax deductions** has been ordered by Internal Revenue Commissioner Russell C. Harrington at the request of Sen Estes Kefauver (D-Tenn.). Kefauver charges electric firms violate all criteria for allowing deductions by using advertising primarily for lobbying, political purposes, or the defeat of legislation.

First "package power reactor" is now generating electricity at Ft. Belvoir, Va., says AEC. It's rated at 1,855 kw.

Southern Nuclear Energy Council will soon offer, to all public and private utilities in 14-state area planning nuclear power projects, aid in removing any state-level restrictions that might impede development.

Gordon W. Evans, Kansas Gas & Electric president, is elected chairman of Southwest Electric Conference . . . Donald S. Kennedy tells group the industry needs to think of selling more than anything else because of drop in load factor, in some cases from 70 to 50% . . . R. S. Stevenson, Allis-Chalmers president, said electric equipment manufacturers spend about three times as much on research as the all-industry average. A-C spent three times as much on research in 1956 as in 1951 and will up expenditures 20% in 1957 over 1956 . . . T. P. Stathas, senior partner of Duff & Phelps, proposes that utilities consider convertible debentures as means of financing in a tight money market.

Operating tests continue on American G&E's pioneer supercritical steam turbine installation at the Philo station on the Ohio River. Loads have been carried up to 90-Mw at 4,500 psi and 1,050F. Operating steam pressure has reached design 4,560 psi but a temperature boost to 1,150F is planned.

Plans for Britain's first major pumped storage scheme get underway as Central Electricity Authority places order with English Electric to build the station at Ffestiniog, North Wales. The four 105,000-hp water turbines will have largest power output of any type water turbine installed in the nation.

Congratulations . . . Watson F. Tait, Jr, has been elected executive vice president and Edwin H. Snyder vice president of electric operation at Public Service Electric & Gas Co . . . Dayton Power & Light Co ups Kenneth G. Oxley to vice president and manager of electric operations and Edward J. Rommel and Josiah V. Colley to vice presidents . . . Anderson Electric Corp's C. E. Bitzer is now vice president of sales for the company . . . Maryland Utilities Assn elects as its president Robert W. Wilson, vice president of Potomac Electric Power Co.

SALES CONFERENCE ▶ **Team up planning and coordination to make the most of your sales efforts.** This came pretty near being the theme of this year's EEI Sales Conference. Participants were urged to back industrywide promotion and sales programs and sell the free enterprise story. Farm Better . . . Electrically promotion was launched. For complete meeting coverage, turn to **pages 45-49.**

EVENTS ▶ **Ohio Edison loses 485 Mw generation output without a customer outage** as rains knock out a transmission line and isolate company's R. E. Burger Station **(p 44)** . . . Texas electric companies form new nuclear power group **(p 40)** . . . Weather men disagree as to whether "heat storms" are predictable **(p 41).**

WASHINGTON ▶ **Lawmakers move toward compromise on preference issue** in Niagara power legislation. It could be a precedent-setting action **(p 43)** . . . Prospects dim for TVA revenue bond bill this year as hearings get underway **(p 93)** . . . AEC proposes open hearings on all applications for nuclear power plants **(p 42).**

ATOMIC PROGRESS ▶ **Pioneering nuclear power engineers take advantage** of inherent, man-made, and geographical factors to enhance atomic plant safety. Glen A. Reed of Yankee Atomic Power Co tells how this is done on a specific plant design **(p 40).**

GENERATION ▶ **Central Information Center (CIS) replaces 13 men at Gulf States'** 274-Mw Neches steam station automatically logging all plant measurements. Plant data are typed out on operation charts. Besides scanning and logging, the CIS is also equipped with an alarm system which calls attention to unusual conditions on any of the seven generating units under its surveillance. One such alarm alerted personnel to a hot fan bearing, persisted in its alarm even after an initial inspection failed to disclose trouble. But CIS was right. A roving plant operator spied a broken oil line on second inspection **(p 60).**

New welding technique enables nonferrous condenser tubes to be welded to tube sheets in the field. With this technique, a 90,000-sq ft steam surface condenser is being erected at Midwestern utility generation station. It is believed to be the first of this construction. Possible uses and economic advantages of the technique are discussed in an article by Allis-Chalmers' Consulting Engineer R. A. Wilson and Research Supervisor W. W. Edens **(p 57).**

DISTRIBUTION ▶ **Recent authoritative residential load study proves what you may have suspected:** Greater use of appliances in today's homes provides a much more diversified power demand than older studies indicated was possible. For one thing, the result of the study shows that transformer capacity installed for each new customer can safely be reduced from previous system standards. From the usable sample of 144 customer demand and use curves, Georgia Power Co has developed curves for five types of customers. Chief Distribution Engineer R. W. Baker describes the method and depth of the load research project and tells how the results are being applied in everyday operations **(p 53).**

SUBSTATIONS ▶ **High-voltage vacuum switches are reported proving out** at two installations: for back-to-back switching of 115-kv capacitor banks at a Bonneville Power Administration substation and for breaking the load of a steel mill served by a 138-kv line on the Utah P&L system. The vacuum switches successfully passed acceptance tests for the two installations and are now in service **(p 59).**

Kansas City P&L saves $46,000 at substation with new design that sacrifices little switching flexibility. The new design calls for the elimination of one oil circuit breaker and two lightning arrester disconnect switches from the design

previously used. H. F. Jenkins, principal engineer, says the equipment eliminated was not essential although it had been considered desirable. Schemes of new and old designs are a part of the article **(p 66).**

SELLING ▶ **Hurry, Hurry, Hurry! Don't miss the electrifying story** of one of the greatest industry shows of the year. It was the Cincinnati G&E-backed "Electric Living Exposition of 1957" played with these ground rules: the promotional tactics of a circus, the excitment of an opening night of a Broadway hit, and the exhibits of a world's fair. Some 20,000 spectators turned out opening day—more than 75,000 came during the nine-day run. Audiences thrilled at the sight of an electrical "Home in the Clouds;" tried their hand at the Live Better . . . Electrically game of chance; feasted their eyes on scores of exhibits; trudged home tired, happy, and more determined than ever to live better . . . electrically **(p 50).**

Addition of electric heating by a residential customer goes long way toward stabilizing his annual kwhr use, according to a study made by Cowlitz County (Wash.) PUD. The results indicated that kwhr use by the electric heating customer climbs at a much slower pace than for the non-heating customer . . . Manufacturers will turn out some 230,000 central air conditioning units for a new growth record . . . "Many Days are Fan Days" is promotion theme for NEMA Electric Fan Section members **(p 72)** . . . Electric powered chain conveyor at Pennsylvania furniture plant saves $2,500 a year over old manual method of moving lumber to a planer **(p 79).**

MANAGEMENT ▶ **Coal prices take another jump this month**—eating a slightly bigger hunk out of electric utilities' revenue dollar. This, with previous increases, raises utility operating expenses and brings on possibility of utility rate boosts **(p 95)** . . . For latest on utility financing, continuing review of annual reports, and public relations techniques, **see pages 97, 98.**

PEOPLE ▶ **J. K. (Pat) Flanagan is elected a vice president** of Florida Power Corp in charge of public relations . . . Byron Price will become general superintendent and secretary of the Eugene (Ore.) Water & Electric Board July 1. He was formerly assistant administrator of Bonneville Power Administration . . . F. E. Stouffer joins McGraw-Edison as vice president and plant manager for the Pennsylvania Transformer division **(p 106).**

MANUFACTURERS ▶ **Westinghouse boosts prices on complete line of dry-type distribution transformers,** 3 through 300 kva, by approximately 11% **(p 102)** . . . New line of outdoor diconnecting switches through 330-kv has demonstrated ability to operate under icing conditions **(p 102)** . . . Plans go forward to merge Elliott Co, manufacturer of motors and turbines, into the Carrier Corp **(p 102)** . . . S&C Electric Co opens new Western Sales Division and announces policy of making this, as well as eastern and central sales divisions, complete autonomous operations **(p 104).**

NEW EQUIPMENT ▶ **Vacuum interrupter switches for service from 7.5 to 230 kv** are now on the market. They are said to be capable of interrupting loads with power factors from zero through the entire leading power factor range to 0.85 lagging. It is claimed they can interrupt 50 amp 10,000 times, 100 amp 5,000 times, and 2,500 amp one time . . . New type residential load transformers are designed for complete burial in ground. These oil immersed, earth-cooled units are available in 15, through 112.5 kva models both single and 3 phase **(p 80).**

ENGINEERING TRENDS

Utility research will spur advances to handle future needs, if proposals of a panel at the recent American Power Conference are adopted. According to Ebasco's H. L. Melvin, this research should be organized and staffed with people who can recognize fields for study, come up with suitable solutions, and push these solutions into practice. Particularly in the distribution field, Melvin urged these organizations to push ahead without leaning too much on the manufacturers . . . Philadelphia Electric's C. C. Farrell supported Melvin's proposals, urged that every major utility set up a research group to review existing equipment and uncover areas for study in preparation for future needs. Designating personnel in the utilities for this research would facilitate the creation of new ideas, stimulated by association with similar personnel from other companies, and enable them to push worthy projects to successful conclusion.

Narrow-band transmission will make TV applicable to more supervisory jobs. Experiments by Bell Telephone engineers in collaboration with several instrument manufacturers have cut band requirements to ¼ Mc and produced usable pictures over standard telephone facilities at distances of 10 to 15 miles. Band-width savings come from cutting image rate to 15 per sec and sweeping with 185 lines instead of the 525 of conventional TV.

Britain spends more of her GNP for research and development than the U. S. Its Treasury Bulletin for Industry reveals expenditures equalling 2% of GNP of which defense projects take about ⅔. American research and development costs about 1½% of GNP, but less than half is allocated to defense projects.

Supercritical steam at 3,300 psi and 1,060F with reheat to 840F will be used in an addition to the Margam Steel Works' power plant in Wales, according to *The Electrical Review*.

FROM EDITORS IN THE FIELD

Power interruption costs of 20 cents per kw and 40 cents per kwhr help the Swedish State Power Board to justify refinements to eliminate or minimize system breakdowns. Primary factors in this evaluation of interruption cost are loss of industrial production and impairment of communications.

A "bread" truck facilitates underground maintenance in narrow alleys for Public Service of Colorado. Storage bins are arranged for access from inside the truck and a 15-kva generator, powered from the engine, operates working lights, tools, and even serves as temporary power for a customer.

Utilities should warn shopping center developers against cable failures and help them to plan on duplicate feeds in the best interests of the utilities and their shopping center customers. Some such centers have been in operation long enough to experience loss of business, prestige, and customer good will from interruptions caused by their own cable failures. In most cases, their developers had ignored, because of cost, sound recommendations of utility engineers which would have averted the interruptions.

"Nothing to it! . . . Putting up the new L-M fluorescent luminaire is easy!" says Carl Hawkinson, Superintendent of Edwards Construction Company, Geneseo, Illinois. "One man can do the job. All you need is a screwdriver, a crescent wrench, and a level."

L-M's New Fluorescent Luminaires Have Slim, Modern Look . . . Easy To Install

L-M's new fluorescent luminaires are styled to give an up-to-date appearance to your streets. Their broad, cool, white light source and efficient reflector system create a cheerful atmosphere in the area, and greatly increase the scope of vision for both the motorist and the pedestrian.

Easy to Install, Easy to Maintain

L-M's new luminaires are conveniently packaged to facilitate installation. Housing is packaged separately so it can be installed first. With the housing in the inverted position, the reflector can be quickly and easily attached and wired. The unit is then rotated 180 degrees, leveled, and clamping screws are tightened.

One piece, side-hinged plastic globe and reflector assembly opens from either side. The luminaire is easily accessible for installation wiring, cleaning, or relamping. L-M's new luminaires are the only units available today that are designed to take both present and future very high output fluorescent lamps.

Get Complete Information

L-M's new street lighting luminaires are available in deep and shallow styles, in both four- and six-foot lengths. For other outdoor lighting applications, such as parking lots, store front lighting, etc., other styles are available. L-M Street Lighting Engineers will cooperate with you in designing the best system for your area.

Ask your L-M Field Engineer or Street Lighting Engineer for more complete information. Or write Line Material Industries, Milwaukee 1, Wis. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

McGRAW EDISON

LINE MATERIAL Industries *Street Lighting*

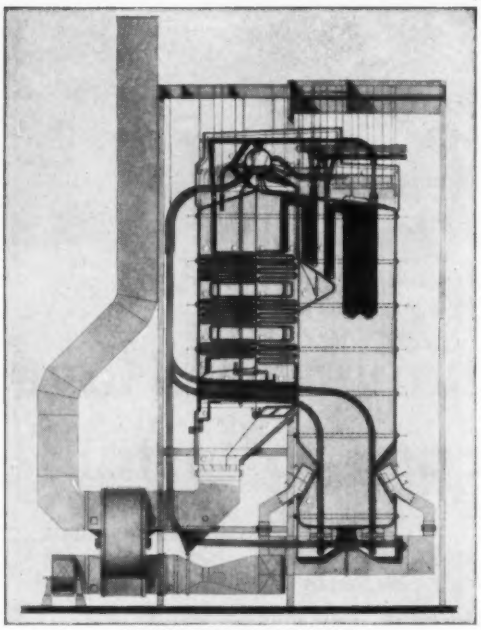
McGRAW-EDISON COMPANY

290A

A record acceptance of a new boiler

18 RILEY BOILERS

In capacities from 150,000 lbs/hr to 1,600,000 lbs/hr



1,600,000#, 2125 psi., 1005 F. Reheat
TURBO FURNACE

-to these public utility and industrial companies:

Louisiana Power & Light Co. — Sterlington Station
1—1,600,000# — 2125 psig — 1005/1005 F — Gas

Dallas Power & Light Co. — Northwest Steam Electric Station
1—1,200,000# — 2225 psig — 1005/1005 F — Gas & Oil

Texas Electric Service Co. — Permian Basin Steam Electric Station
1—825,000# — 1750 psig — 1005/1005 F — Gas & Oil

Florida Power Corporation — Enterprise, Florida
1—600,000# — 1750 psig — 1000/1000 F — Gas & Oil

Delaware Power & Light Co. — Delaware City Power Station
3—500,000# — 1425 psig — 950 F — Fluid Coke

Manila Electric Co. — Republic of the Philippines
1—430,000# — 2100 psig — 1005/1005 F — Oil

Chemical Company — Texas
1—825,000# — 1850 psig — 1005/1005 F — Gas

Chemical Company — Michigan
1—400,000# — 1400 psig — 830 F — Pulv. Coal

Petroleum Refining Co. — California
1—500,000# — 1425 psig — 750 F — Fluid Coke

Aluminum Company — Louisiana
3—320,000# — 1000 psig — 905 F — Gas & Oil

Chemical Company — West Virginia
1—289,000# — 675 psig — 670 F — Pulv. Coal

Chemical Company — West Virginia
1—175,000# — 450 psig — 575 F — Pulv. Coal

Paper Mill — Maine
1—175,000# — 500 psig — 725 F Pulv. Coal

Electrical Equipment Manufacturer — Illinois
1—150,000# — 900 psig — 835 F — Pulv. Coal

RILEY DESIGNS, MANUFACTURES AND ERECTS COMPLETE STEAM GENERATING UNITS AND FUEL BURNING EQUIPMENT FOR PUBLIC UTILITY AND INDUSTRIAL POWER PLANTS

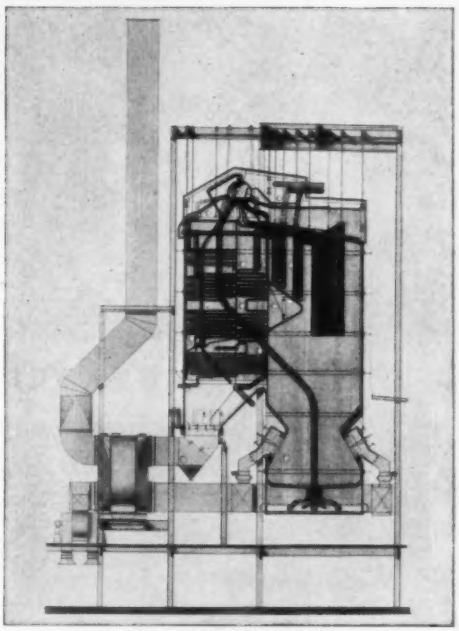
design first announced in late 1954!

TURBO FURNACE SOLD TO DATE!

-for a total of 9,679,000 lbs/hr!

-for one or more of these reasons:

- To be able to fire a wide range of fuels
- For quick, low cost conversion to solid fuels
- To burn fluid coke as a major fuel
- To eliminate slagging and slag blowers
- To refire flyash and eliminate flyash removal
- For these higher operating economies:
  - Higher efficiency
  - Negligible carbon losses in combustibles
  - Better temperature control
  - One level burner operation

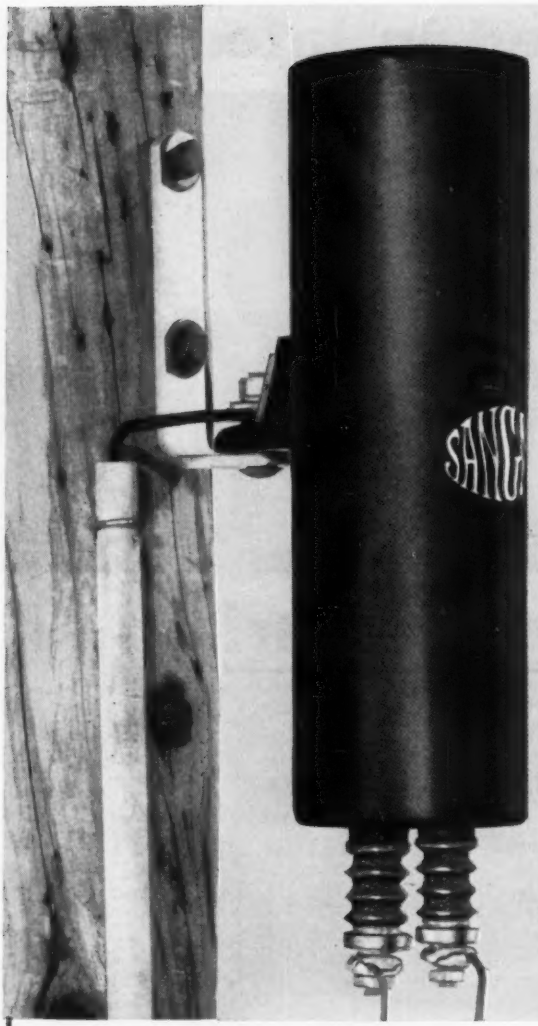


TURBO FURNACE
825,000# 1750 psi., 1005 F. Reheat

A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs.

RILEY
Stoker Corporation
WORCESTER, MASSACHUSETTS

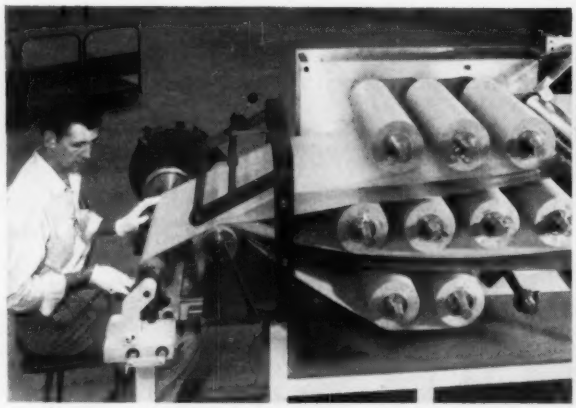
Sales Offices: Worcester, New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, Charlotte, New Orleans, Atlanta, St. Louis, Kansas City, St. Paul, Houston, Denver (Englewood), Salt Lake City, Los Angeles, San Francisco, Portland, Seattle.



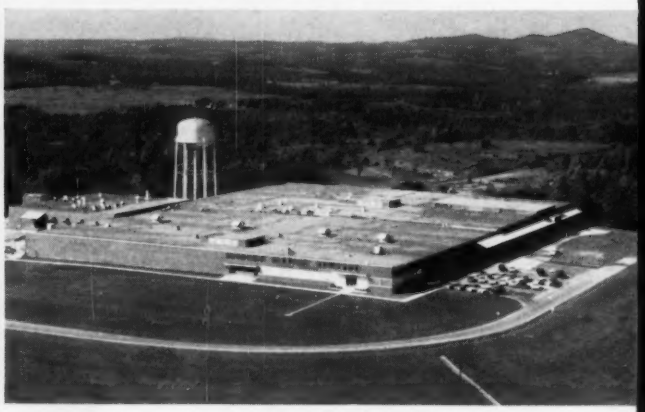
NOW...SANGAMO

Small in size
Light in weight
Easy to handle
Easy to mount

INCREASED PRODUCTION FACILITIES



Dielectric packs are wound under controlled atmospheric conditions to eliminate any possibility of contamination.



This modern Sangamo plant in Pickens, South Carolina, now supplements the Illinois facilities for capacitor production.

SECONDARY CAPACITORS!

to release transformer capacity, reduce losses, and improve voltage levels on secondary circuits

Sangamo secondary voltage rated capacitors are built with the same processing care and to the same high standards that have put Sangamo Diaclor Primary Capacitors on the "approved list" of most major utilities in two short years. They are built to distribution engineer's specifications—with *all the features you want* to meet your service requirements.

CORROSION-RESISTANCE THAT'S MORE THAN SKIN DEEP—Cylindrical cases are of all welded steel construction, with mounting supports brazed to the case. There are no pockets to accumulate dirt or moisture. Tin plating, aluminum metallizing and two coats of baked vinyl resin base paint provide corrosion resistance even when case is scratched.

CYLINDRICAL DESIGN WITH HIGH PURITY KRAFT PAPER AND ALUMINUM FOIL—Provides an efficient unit with minimum weight and size. Elimination of foil tabs prevents possible injury to paper.

SPECIAL DIACLOR IMPREGNATION FOR STABILITY OVER A WIDE TEMPERATURE RANGE—These capacitors operate at temperatures from −40°C to +46°C.

INTERNAL DISCHARGE RESISTOR TO PROTECT LINEMEN—Reduces residual voltage to 50 volts or less in one minute.

PERMANENT HERMETIC SEAL WITH SOLDER SEALED BUSHINGS—Wet process porcelain bushings, metal bonded to the case, provide gasketless seal. Clamp type terminals are of tinned copper alloy, can be used with any type of conductor.

UPRIGHT OR INVERTED SWIVEL MOUNTING—Enables best utilization of available pole space.

Order from your Sangamo Representative, or write us for complete information and prices.

Size	Diameter	Overall Height	Net Weight
3 KVAR	5-7/16″	15-3/8″	18 lbs.
5 KVAR	5-7/16″	21-3/8″	28 lbs.

PC57-2

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

FURNISHED WITH POLE MOUNTING BRACKET THAT PERMITS LAG SCREW MOUNTING TO POLE—Standard EEI-NEMA cross-arm mounting bracket can be furnished when specified.

GROUNDING LUG—A grounding clamp for up to No. 2 solid wire is part of the mounting-bolt assembly.

LEADS—Two 48-inch, 600 volt insulated flexible copper leads are furnished.

INDICATING FUSES—Integrally mounted with the leads, can be furnished at extra cost. Fuse waves a red flag as positive signal for outages—stays intact after operation.

A question for every electric utility

JUST HOW FLEXIBLE CAN POWER SUPPLY GET?

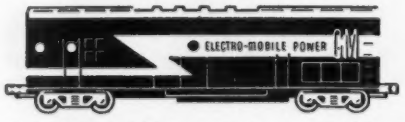
Giant strides to improve flexibility of supply to customers have been taken in recent decades by the electric utility industry. Today power availability must anticipate load growth more than ever before. Inter-connected supply permits transferal of power from one area to another as varying geographical load demands or emergency situations arise.

Even greater flexibility, however, can be attained—by means of Electro-Mobile Power. Truck-trailer or rail units permit shifting increments of power from place to place as demands change. Units can be used singly or in multiple—added like building blocks to match requirements exactly. And provision for impulse starting and stopping allows unattended operation from any location in the system.

Moreover, the placement of Electro-Mobile Power close to the load not only relieves the central station of a block of power, but also reduces the line loss between the central station and the load for that block of power. This is a major factor at time of peak.

Just how flexible can service get? Far more flexible than you might imagine with present equipment if Electro-Mobile Power is employed to answer additional requirements. A joint analysis of your system can reveal the savings and increased flexibility possible with these units. Contact your Electro-Motive representative for full information.

Electro-Mobile Power adds to system flexibility in many ways

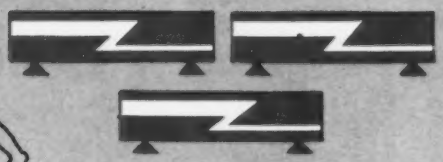


RAIL CAR—1000 kw units for use on sidings or placed on piers for semi-permanent use.

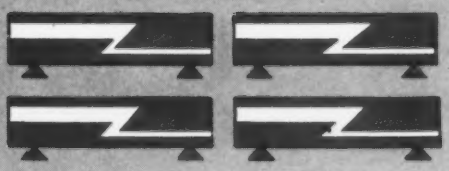
TRUCK TRAILER—500 kw units offer excellent mobility for many temporary applications.

Representative electric utility companies across the country are now providing better service to customers through the use of Electro-Mobile Power. This diagram is a composite of the different jobs these units, both truck-trailer and rail, are performing. Detailed information on these applications—operating costs, KWH produced, reason for use, location, etc.—are available through your Electro-Motive representative.

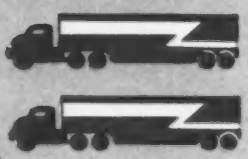
Rail units used for peaking.



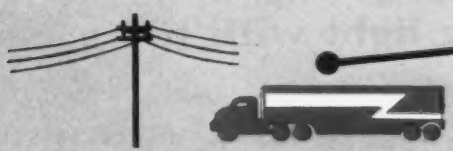
Rail units used for boosting.



Rail units used for temporary service during growth stage of new community. Units are added or subtracted until level is reached and permanent facilities can be erected in the most desirable location.



Mobile trailer units thrown into service during temporary outage caused by flood.

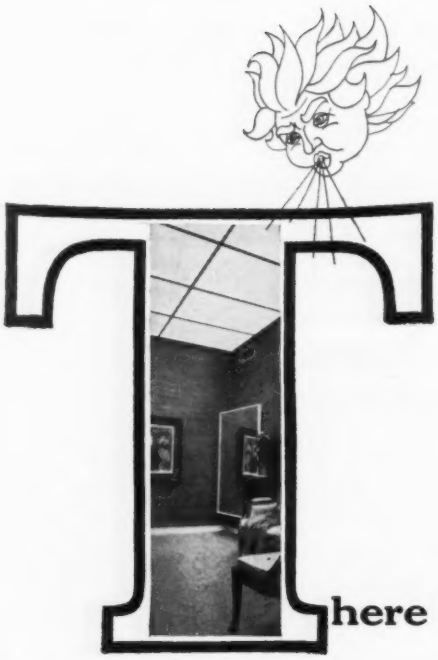


Mobile trailer units being used during line relocation resulting from new highway construction.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

LA GRANGE, ILLINOIS

Sales Offices in Chicago, New York, St. Louis, San Francisco



There is only one light diffusing ceiling that actually helps circulate the air from overhead air conditioning and heating systems (it's used solely for this purpose by air cooler manufacturers) yet obscures overhead utility systems (by 45 or 60 degree shielding) while transmitting light with the greatest known efficiency and with the absolute minimum of surface glare....

HONEYLITE®

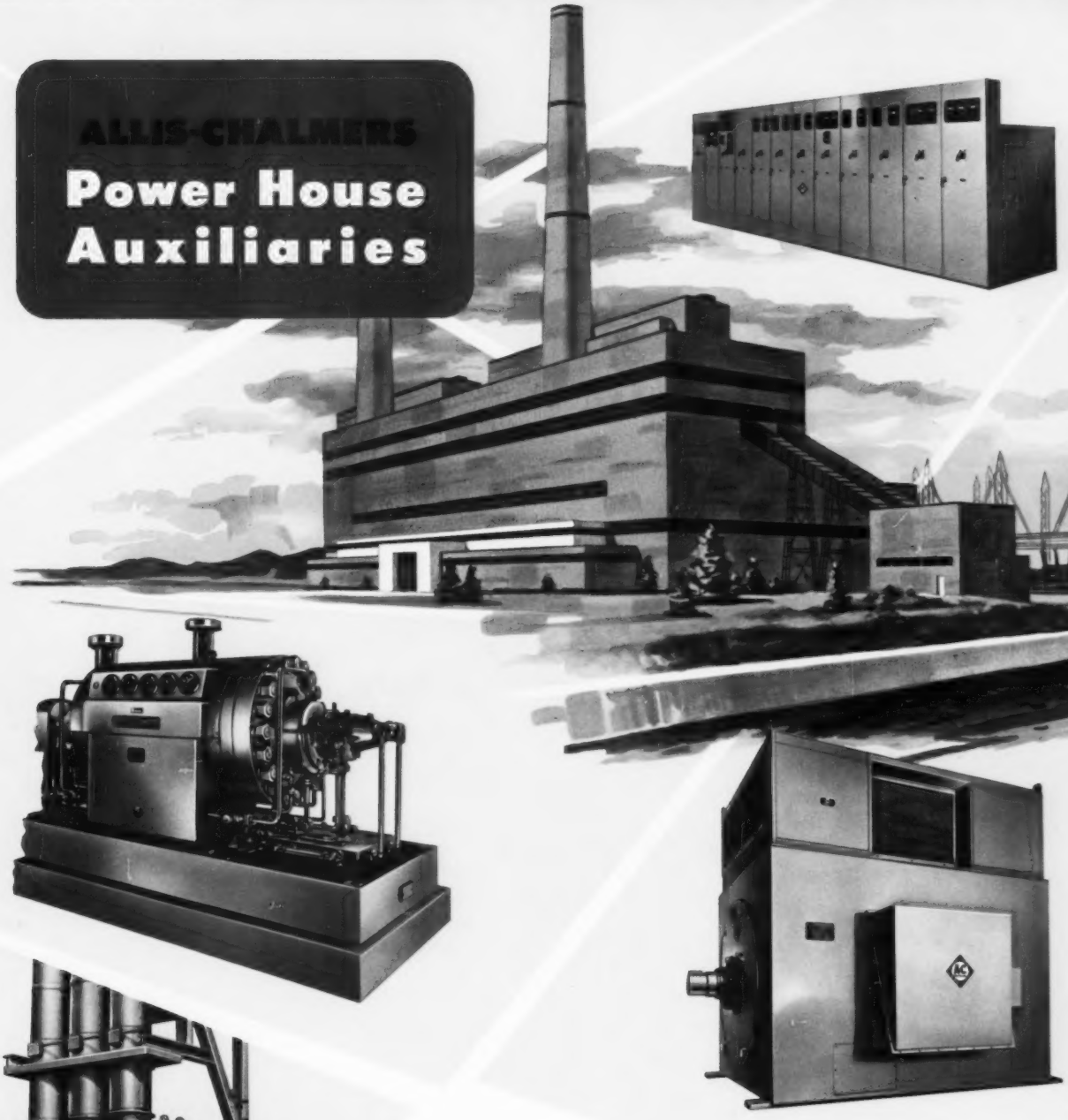
LIGHT-DIFFUSING ALUMINUM HONEYCOMB

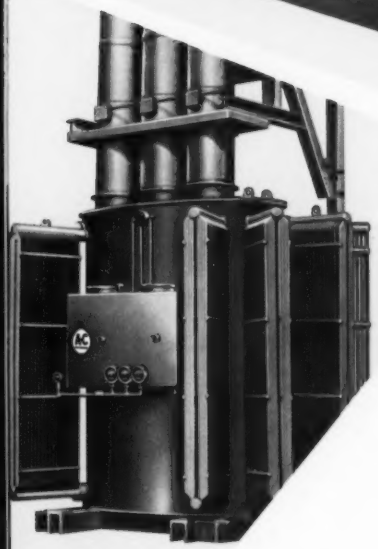
A DEVELOPMENT OF HEXCEL PRODUCTS INC.

951-61ST STREET, OAKLAND 8, CALIFORNIA

ALLIS-CHALMERS

Power House Auxiliaries





Built-Together, Work-Together Units

— that fit the modern standards of power house performance

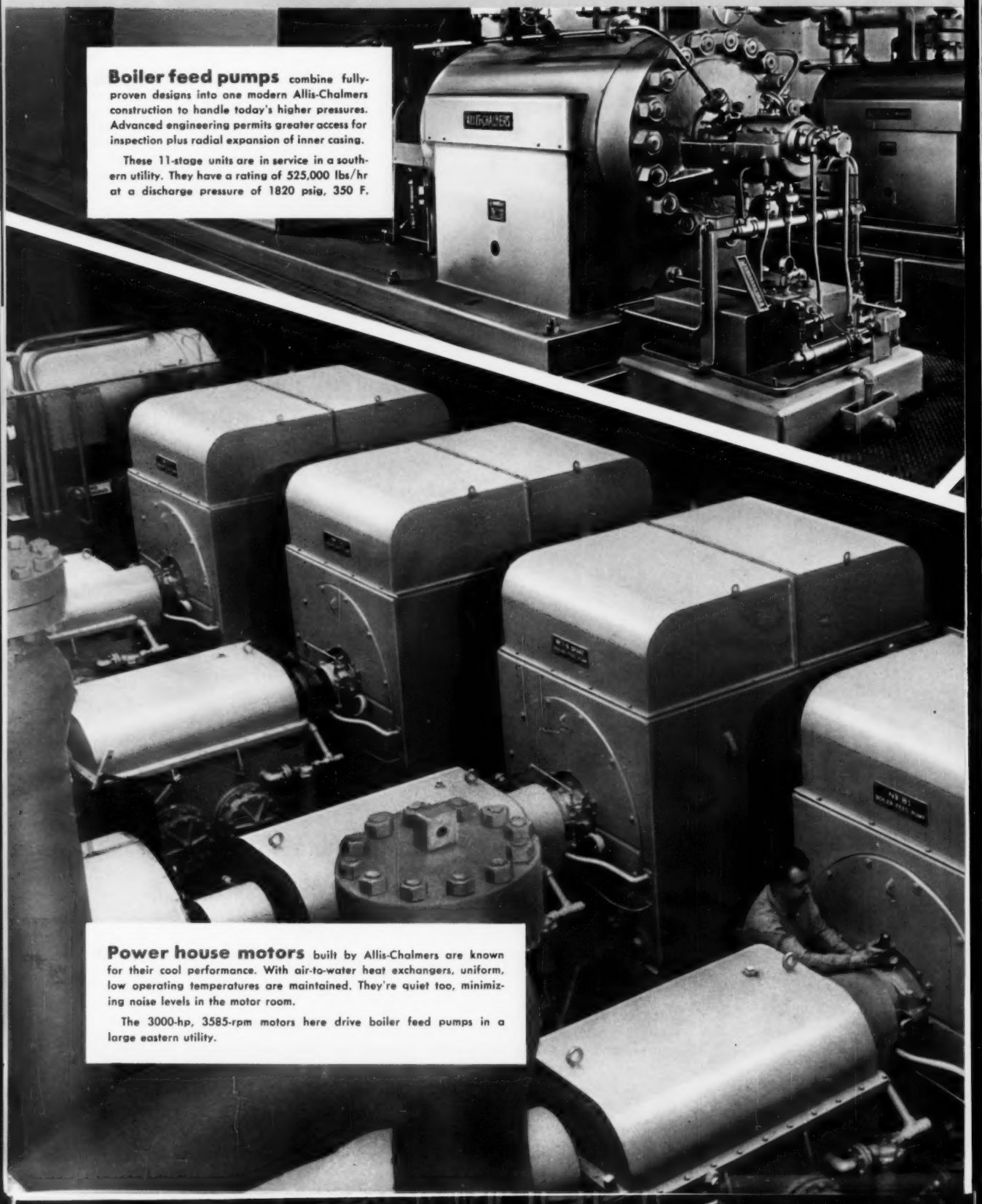
Only Allis-Chalmers designs, builds, tests and applies *all* major station auxiliaries. This assures the utmost in integrated engineering and undivided responsibility . . . meets today's conditions of high load factor and continuous availability.

ALLIS-CHALMERS

A-5121

ALLIS-CHALMERS

Motors and Pumps—



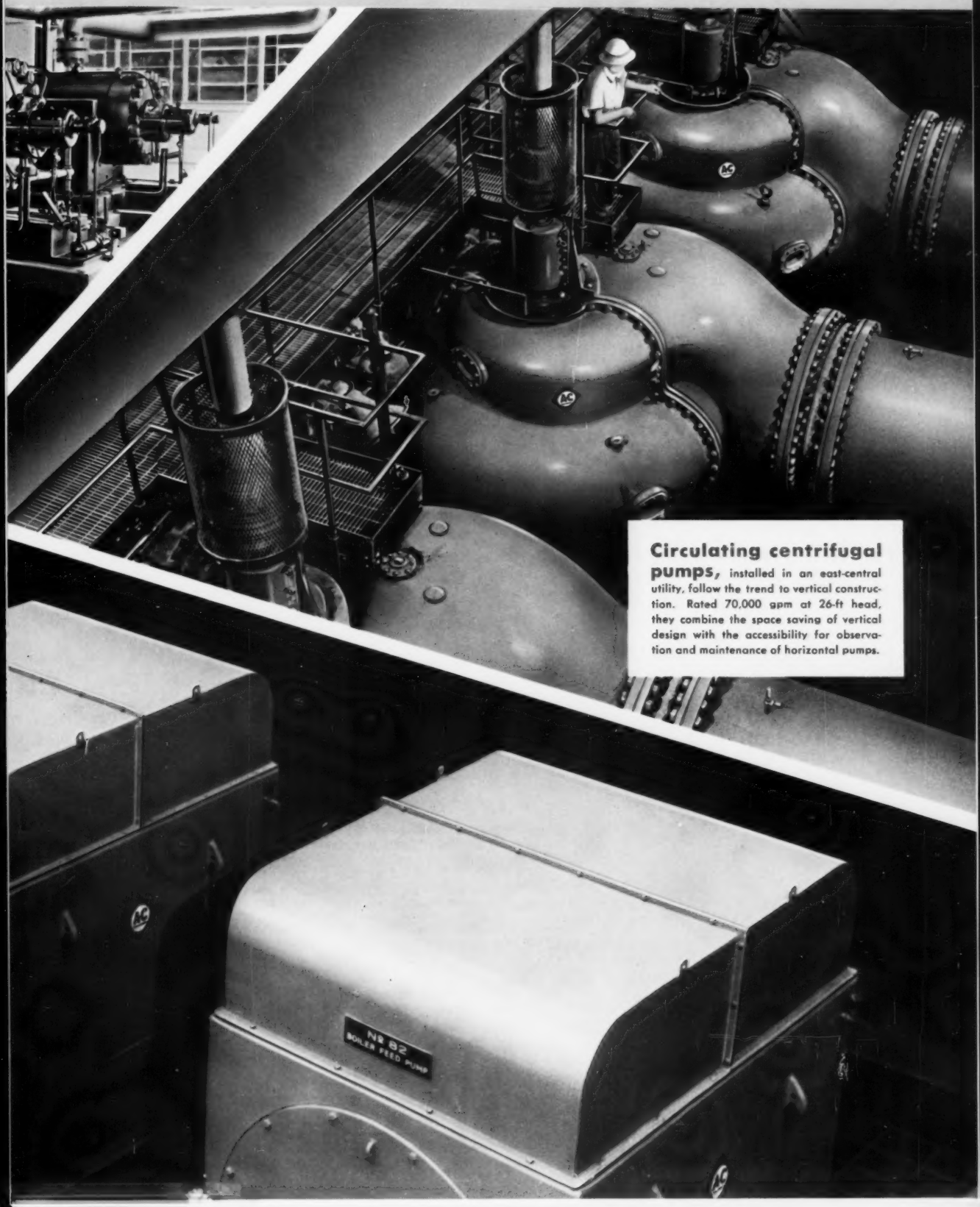
Boiler feed pumps combine fully-proven designs into one modern Allis-Chalmers construction to handle today's higher pressures. Advanced engineering permits greater access for inspection plus radial expansion of inner casing.

These 11-stage units are in service in a southern utility. They have a rating of 525,000 lbs/hr at a discharge pressure of 1820 psig, 350 F.

Power house motors built by Allis-Chalmers are known for their cool performance. With air-to-water heat exchangers, uniform, low operating temperatures are maintained. They're quiet too, minimizing noise levels in the motor room.

The 3000-hp, 3585-rpm motors here drive boiler feed pumps in a large eastern utility.

Proven by Installation

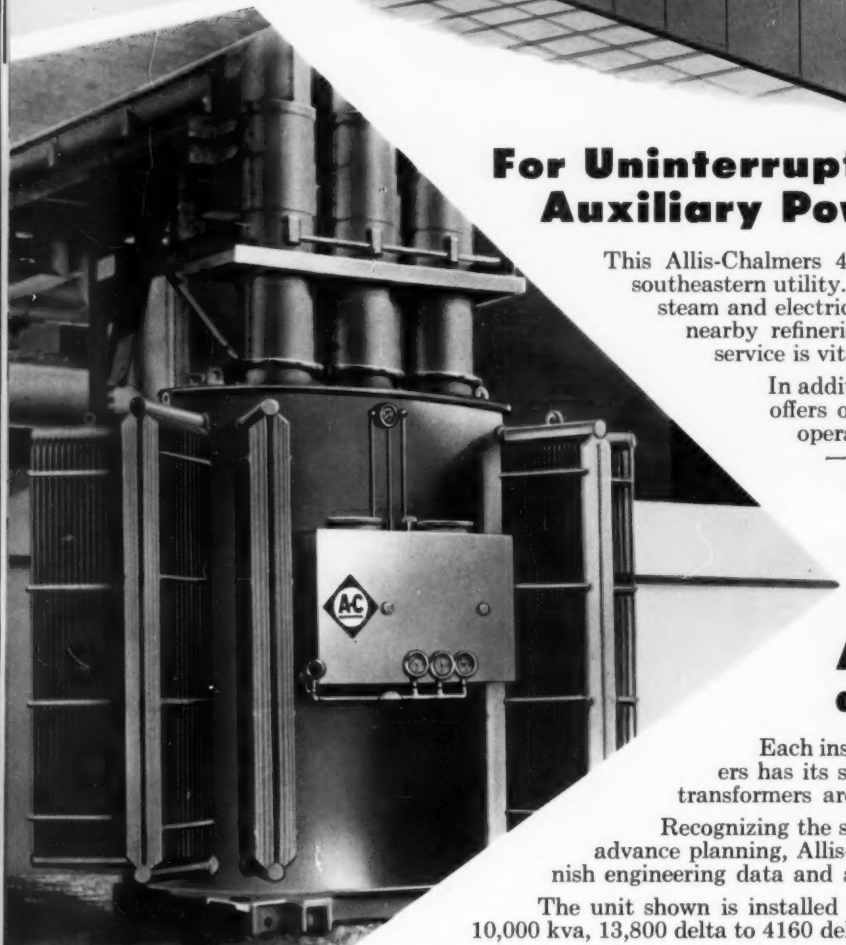


Circulating centrifugal pumps, installed in an east-central utility, follow the trend to vertical construction. Rated 70,000 gpm at 26-ft head, they combine the space saving of vertical design with the accessibility for observation and maintenance of horizontal pumps.

For Uninterrupted Auxiliary Power

This Allis-Chalmers 4.76-kv switchgear is installed in a southeastern utility. In addition to normal loading, both steam and electricity are supplied around the clock to nearby refineries by this station — continuity of service is vital!

In addition to dependability, this switchgear offers other advantages in installation and operation. On this job—as in many others — Allis-Chalmers engineers worked in close cooperation with both consulting engineers and utility engineers.



Balanced Design Assures Economy and Reliability

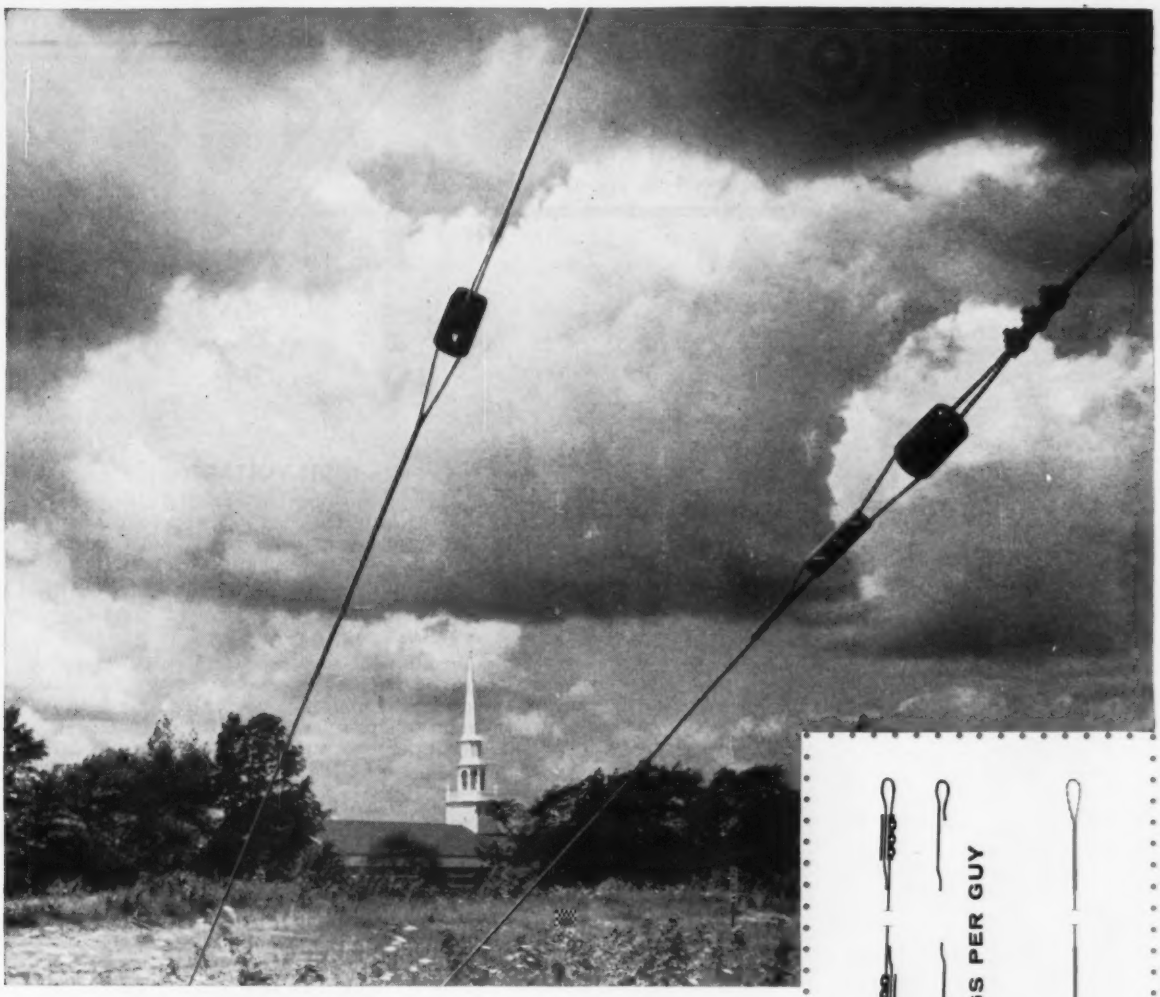
Each installation of station service transformers has its special requirements. Mass-produced transformers are not adequate for this application.

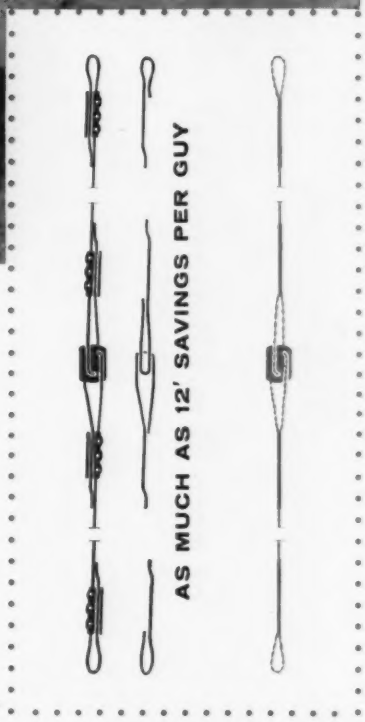
Recognizing the special requirements and the need for advance planning, Allis-Chalmers can be relied upon to furnish engineering data and approval drawings promptly.

The unit shown is installed in a West Coast utility. It is rated 10,000 kva, 13,800 delta to 4160 delta.

For more information on Allis-Chalmers equipment for power stations, contact your nearby A-C District Office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS





PX-80

Up to 30% savings in strand... with PLP Guy-Grip Dead-Ends

You will find real guying economy with PLP Guy-Grip dead-ends. Because they eliminate strand looping, you can use *shorter, straight* lengths of guy strand. This means as much as 12 feet savings in strand per guy. What's more, the finished installation is neat, streamlined, efficient.

Made in accordance with or for use under U. S. Patent No. 2,761,273; other patents issued and pending.

PREFORMED LINE PRODUCTS CO.

5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO
DEPT. NO. PR1B
Telephone: Cleveland EXpress 1-3571

5 reasons why

SUPERIOR HIGH AND LOW VOLTAGE BUSHINGS

HIGH VOLTAGE:

Bushings internally clamped — multi skirted for extra long creepage distance—terminals will accommodate either copper or aluminum conductor in full range of sizes required by EEI-NEMA Standards.

LOW VOLTAGE:

Bushings of wet process porcelain interlocked with tank to prevent rotation — solderless connector type terminals highly resistant to stress corrosion; will accommodate either copper or aluminum conductor in full range of sizes required by EEI-NEMA standards.

TIME SAVING EXTERNALLY OPERATED TAP CHANGER

Eliminates entering tank . . . tap position can be quickly identified and easily changed without disturbing transformer seals. Entire assembly impulse tested in accordance with NEMA standards. Stationary contacts of forged copper with round heads for easy operation, long life. Insulated handle grounded and marked for positive positioning.

MAINTENANCE FREE TANK

Tank constructed of heavy-gauge, rust-resistant, copper bearing steel. All seams, brackets and mounting pads are arc welded to eliminate moisture collecting cracks and crevices. Tank finish is durable, three coat modified alkyd paint.

Corrosion dangers minimized by domed cover, stainless steel cover band, stainless steel mounting pads.

transformers are better

RUGGED CORE-COIL ASSEMBLY

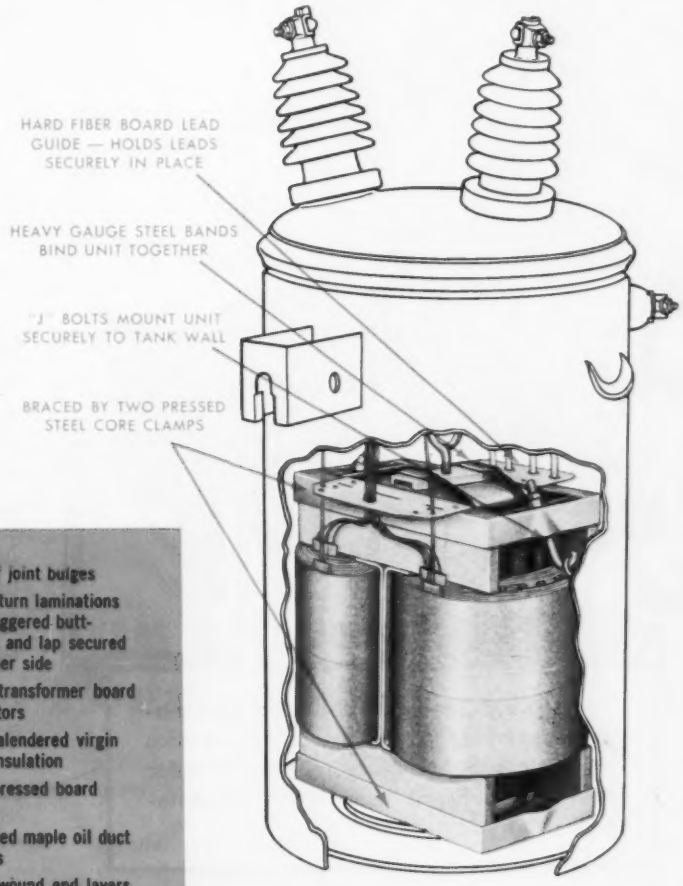
Maximum mechanical strength of core-coil unit is obtained by RT&E's unique core-coil clamping method. This eliminates the conventional vertical clamp members by utilizing the tank for this purpose.

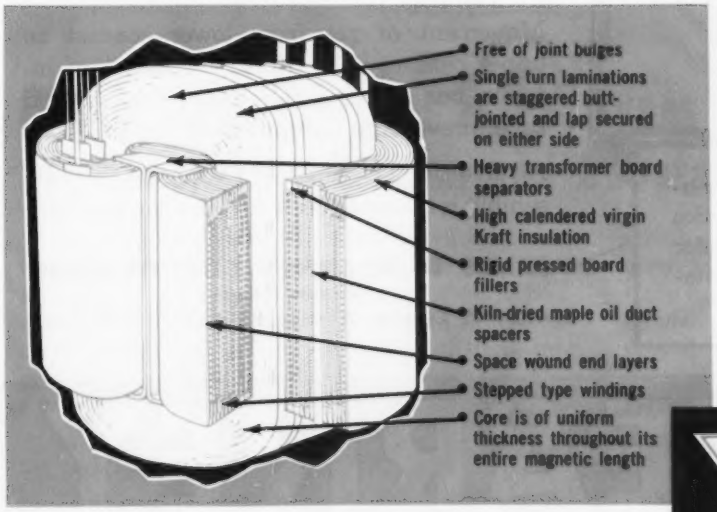
A rigid, unitized construction is thereby attained. Maintains all parts firmly fixed with relation to each other — additional coil surface is exposed to the cooling oil, and additional strength is gained for bracing the coil against distortion during short circuits. Quiet operation assured.

EXCLUSIVE CORE CONSTRUCTION

RT&E's exclusive wound core of single turn laminations with staggered, interleaved butt joints is formed from the finest non-aging, high permeability, cold reduced silicon steel.

This core, together with a coil of outstanding design, results in a transformer that has low losses, regulation and weight and is high in impulse strength and overload capacity.


HARD FIBER BOARD LEAD GUIDE — HOLDS LEADS SECURELY IN PLACE
HEAVY GAUGE STEEL BANDS BIND UNIT TOGETHER
"J" BOLTS MOUNT UNIT SECURELY TO TANK WALL
BRACED BY TWO PRESSED STEEL CORE CLAMPS


Free of joint bulges
Single turn laminations are staggered butt-jointed and lap secured on either side
Heavy transformer board separators
High calendered virgin Kraft insulation
Rigid pressed board fillers
Kiln-dried maple oil duct spacers
Space wound end layers
Stepped type windings
Core is of uniform thickness throughout its entire magnetic length

RT&E Transformers are designed and built to the highest standards. A dependable product produced by a dependable company and backed by a full five year guarantee. Available from warehouses conveniently located throughout the U.S.

RT&E

CORPORATION

WAUKESHA, WISCONSIN

Helping provide power for America

You get famous KEARNEY DEPENDABILITY with these field-proved TRIPOMATIC features

Exclusive housing construction—greatest possible weather protection! Lead-in connection terminals are isolated from the internal chamber of cut-out by a porcelain wall.

Hanger and contacts attached by *bolting*—eliminates all possibility of loosening or pulling out.

Three-point shock absorber consists of upper and lower contact springs and a tripping spring. The cable of the fuse link is automatically clamped under predetermined constant pressure without the use of thumbscrew or winged nut.

Movement of gas from lower contact to upper contact is restricted by means of interior box construction and collar around tube, preventing internal short circuits.

All live parts completely enclosed—door assembly is de-energized when in open position.

and . . . Field-Tested for full-rated performance. Interrupting Ratings of Tripomatics are proved by actual rigorous tests, under field conditions, at KEARNEY's Substation Laboratory.

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SAFER MAINTENANCE
Specify KEARNEY PRODUCTS
JAMES R. KEARNEY CORPORATION ST. LOUIS MO. GUELPH, ONT.
The Mark of Quality

Plants at: ST. LOUIS • FAYETTEVILLE, ARK. • SHENANDOAH & CLARINDA, IOWA—GUELPH, ONT., CANADA

SHELL FORM
CORE FORM
Substation Transformer
100,000 KVA, 3 Phase
With load tap changing equipment. High Voltage: 330,000 Grd Y volts with ±10% regulation in 32 steps of 5/8%. Low Voltage: 14,400Δ volts.
Generating Station Transformer
48,000 KVA, 3 Phase
High Voltage: 115,000 Grd Y volts. Low Voltage: 13,200Δ volts.

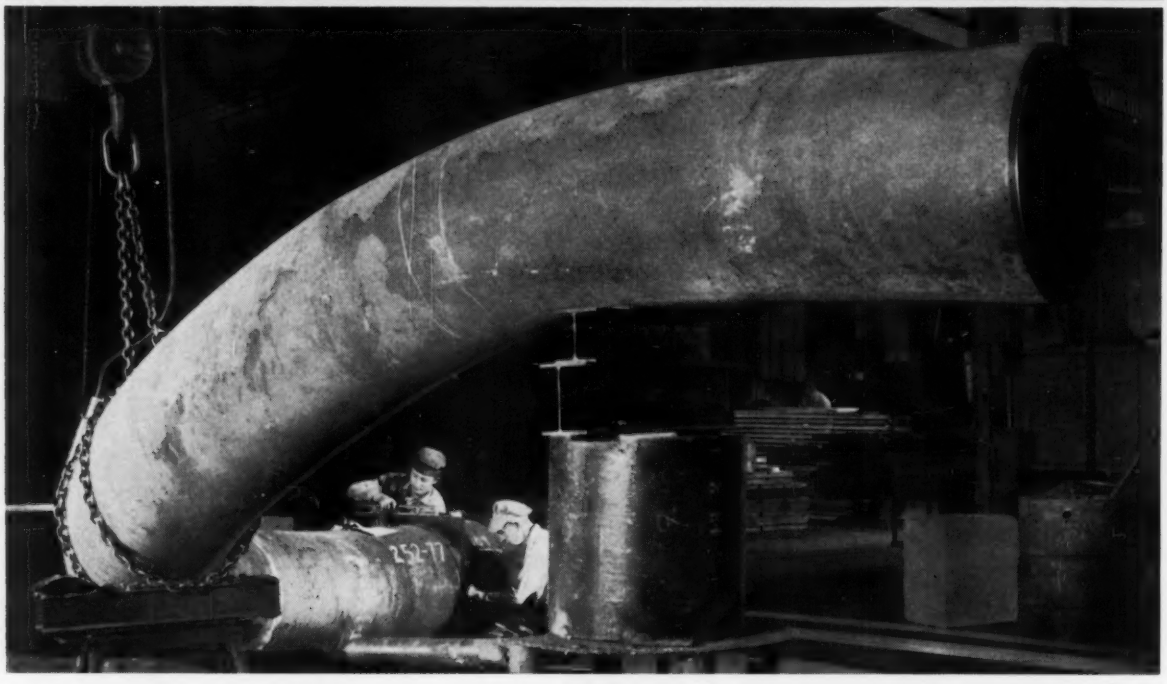
Pennsylvania builds *Both* types of Power Transformers for Generating Station and Substation Service

With wide experience in both shell form and core form design, Pennsylvania Transformer engineers are able to provide the transformer that is best suited to every application. Full consideration is given to size and weight, ease of installation, impedance, resistance to short circuit stresses, insulation strength, method of cooling, and other characteristics which result in definite advantages in a given kva and voltage for one design or the other. **Core form or shell form?** Why not let the answer for your next transformer be based on Pennsylvania's proved principles of power transformer design? Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

PENNSYLVANIA TRANSFORMERS

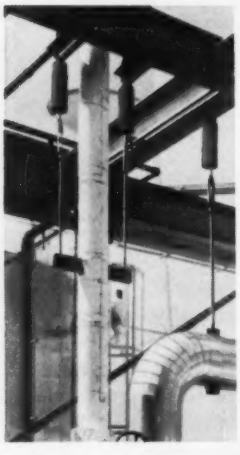
PENNSYLVANIA POWER TRANSFORMERS

BLAW-KNOX has what it takes—to provide these products and services



Large chrome moly pipe being readied for shipment to new generating station. Making a right angle bend followed by a 24 degree, 18 foot bend in this heavy 27½ inch chrome moly pipe required all the skill and modern facilities of the Blaw-Knox power piping shop. Before shipment, piping is heat-treated and ultrasonically tested with a radar-type device for detection of any defects.

A new Blaw-Knox "6 x 6" Flexibility Matrix Method of computing stresses in power piping systems is now available to consulting engineers, companies, and individuals responsible for the design of power piping systems. By the use of an electronic computer this method cuts calculating time from months to a day; assures full accuracy to six significant figures; and has no limitations on the complexity of the system. Write for further information about our new "6 x 6" Flexibility Matrix Method.



Two-way control over movement of piping is provided by Blaw-Knox functional spring hangers with the patented internal swivel action—shown in this modern outdoor generating station. Our experienced engineers are available to both design and make recommendations for your hanger requirements. To get full information, write for Catalog No. 54.

Each year serious fire strikes one out of every seven manufacturing firms in this country. Be safe. Let a Blaw-Knox fire-protection engineer study your needs —and explain how you can pay for the system on our lease or deferred payment plan. To get more information send for Bulletin No. 2426—"Fire Can Destroy Your Business."

BLAW-KNOX COMPANY

Power Piping and Sprinkler Division

829 Beaver Avenue • Pittsburgh 33, Pennsylvania

Complete facilities for prefabrication and erection of piping systems for all pressures and temperatures . . . complete line of standard and custom-engineered pipe hangers, supports and vibration eliminators . . . complete line of automatic sprinkler systems for standard and special hazards

Tear up

those old cost estimates!

The low prices of the new Copperweld* Type M Guy Strand make your old cost estimates out-of-date! Copperweld has always given you more years of service per dollar of cost. Now, prices on Type M Guy Strand make first cost lower and more attractive.

Basically, the principle of the new Type M Guy Strand is still the same—each wire has a heavy copper sheath inseparably molten-welded to an alloy steel core. Lower prices result from a new higher strength strand developed by Copperweld research, and from new specialized guy strand production techniques.

Type M Guy Strand is available in 2.2M, 4M, 6M, 8M, 10M, 12.5M and 16M strengths. It is pliable —easy to install. And, because of the molten-weld, the copper will not crack, flake or peel. Write today for complete details about this money-saving product.

*Trade Mark

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New Copperweld TRADE MARK

COPPER MOLTEN-WELDED TO STEEL

TYPE M GUY STRAND

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AMCRECO
PRESSURE TREATED WOOD PRODUCTS
union camp

means *Better Service*

for users of treated wood!

TIES
BRIDGE TIES
POLES
CROSS ARMS
PILES
TIMBER

The American Creosoting Corporation, a pioneer in the development of the wood preserving industry has joined forces with Union Bag-Camp Paper Corporation—one of the nation's most progressive manufacturers of products from wood.

As a result, AMCRECO'S technical skill and experience, developed through half a century of serving the largest users of treated wood, is now reinforced by Union-Camp's resources.

Convenient plant locations, extensive resources and experienced personnel have been teamed to provide you with a new standard of service and dependability. This will be reflected in modernized facilities, improved deliveries (from stock in many cases) and careful attention to your specifie requirements.

Let us show you how this new organization can be of help to you.

Time is Our Best Testimonial

AMCRECO
PRESSURE TREATED WOOD PRODUCTS
union camp

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AMERICAN CREOSOTING CORPORATION
Louisville 2, Kentucky
18 Strategically Located Treating Plants to Serve You

Subsidiary of
UNION BAG-CAMP PAPER CORPORATION

ELECTRONIC TESTING... BY PUSH BUTTON!

Patent applied for.

Yes, just push a button and automatically, HyperCore Distribution Transformers are Tested, Proved and on their way . . . all neatly crated, of course . . . to your utility.

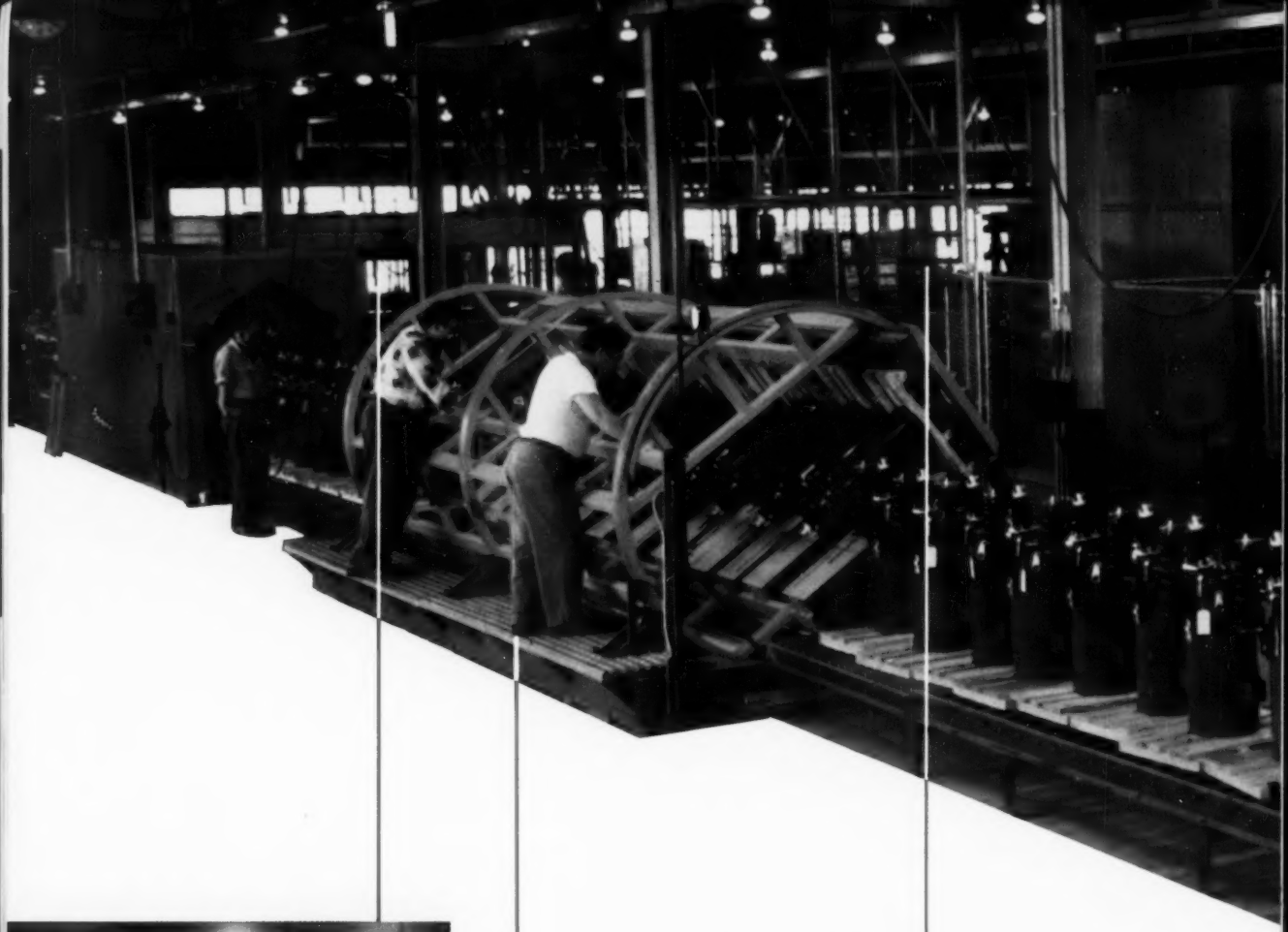
Our new, automatic testing system, applied to the new and enlarged production facilities, guarantees production of HyperCore Transformers of the quality you want, in the quantities and ratings you want.

Control room for the automatic test system contains equipment which automatically records test data for each transformer as it goes through the test area.

Manufacturers of MOLONEY ELECTRIC *Transformers for Utilities, Industry and Electronic Applications*

SALES OFFICES IN ALL PRINCIPAL CITIES
FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Bulletin H-307-157



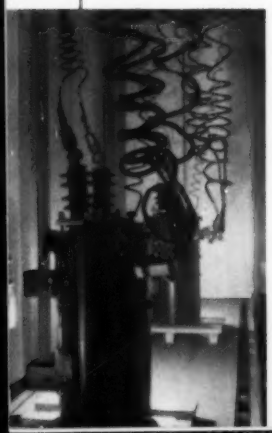
Test Control Room—All test station controls, test metering and recording equipment, and electronic rejection circuits are installed and monitored here. Filtered atmosphere, pressurized to eliminate dust and dirt is constantly maintained to insure accuracy of tests. Results of each transformer's tests are automatically recorded here.

Automatic Test Line through which all HyperCore Transformers must pass successfully before crating and shipment. All standard ASA Tests are made here automatically. Transformers are energized for these tests from overhead bus and test result is automatically recorded as each transformer reaches each test area. This eliminates the possibility of human error.

Oil-tight Leak Test . . . transformers are turned upside down to insure that all opening gaskets are leak-proof. Every seal must withstand the gravity pressure of the oil before shipment. This insures that transformer oil is kept "in" and air, moisture and all foreign matter is kept "out."

The audible sound level of each HyperCore Transformer is recorded as it passes through the sound chamber. These tests are performed automatically on each transformer. Super-sensitive microphones in close proximity to the transformer accurately record the sound level in this chamber which has a lower ambient noise level than most radio broadcasting studios.

Prior to entering automatic test system, HyperCore Transformers, after sealing, are conveyed into vacuum tanks while core-and-coil units are still well above ambient temperature. Vacuum pressure is applied to remove any air that may be trapped in the transformer. The transformers are then ready to begin tests in the automatic testing line.



After assembly and tanking, HyperCore Distribution Transformers are conveyed to the test department. Then begins the trip through the electronically controlled automatic testing department. A moving conveyor belt moves each transformer through each test area. Here automatic testing, analysis, approval or rejection takes place. This view shows the overall test area.

All standard ASA tests are made on each transformer plus noise level test, impluse test, "upside-down" leak test and CSP Breaker test, when applicable.

MOLONEY ELECTRIC

Finish imperfections such as scratches or scuffs are spot sprayed as the transformers leave the final leak test area. Deteriorating elements are thus not able to reach the metal surfaces of HyperCore Tanks.

After final spot spraying HyperCore Transformers pass through an automatic drying oven. This insures that all touch-up spots match the original tone of the baked tank finish and also guarantees that the entire finish is completely impervious to all normal atmospheric conditions.

When HyperCore Transformers reach the crating department they are performance-proved, leak-proof and wear a perfect protective paint coating. With HyperCore . . . if it's crated, it's as rated!

Warehouses, completely stocked, are maintained throughout the United States to insure fast delivery of HyperCore Transformers in the quantities and ratings you desire.

PHOTOGRAPHS BY WESLEY BOWMAN

MOLONEY ELECTRIC

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Manufacturers of Transformers for Utilities, Industry and Electronics Applications

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FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

EDITORIALS

Interconnections Prove Themselves in Ohio

Two weeks ago today in Ohio the resilience and stability of large modern interconnected power systems were demonstrated as seldom before in history. Completely dispelled were any lingering doubts about the contribution of major interconnections to the continuity and integrity of electric service on the vast power systems of tomorrow.

The test came when rains undercut foundations and dropped one double-circuit 138-kv line into another. This effectively cut the R. E. Burger generating station from the Ohio Edison system and threw the 485,000 kw it was carrying onto the interconnected system.

Several things make this occurrence distinctive:

1. It involved loss of nearly a half million kilowatts of generation—a possible record.

2. It happened at time of daily system peak.

3. It came without any warning whatsoever.

But above and beyond these considerations the outstanding fact remains that not one customer suffered a service interruption. Moreover, it would have required instruments to detect the dip of 6 volts (120-v base) that occurred or the drop to 59.92 cps in frequency.

Interconnections with three neighboring power companies picked up 410,000 kw of the lost generation instantly and carried it for nearly a day.

As utility loads grow in the future, the size of power plants and generating units will increase. Accidents like the one in Ohio will involve bigger blocks of power. But the Ohio incident has shown that this fact need not necessarily mean interruptions to bigger blocks of customers, not if the size and capacity of interconnections keep pace with load growth.

As we see it, ability to pick up emergency loads in blocks of a half million or a million or more kilowatts in the future depends on having interconnections ample enough to integrate systems into groups large enough to handle loads of this size.

Today the provision of stronger transmission interconnections is getting increased attention. The Ohio utilities are to be congratulated for being in the vangard of such a movement.

Hells Canyon Decision: Authority Properly Exercised

"A triumph for the orderly process of government . . . not particularly any victory for Idaho Power Company."

In these modest words President T. E. Roach of Idaho Power has put in proper perspective the Supreme Court's recent refusal to review a Federal Power Commission license to his company to build three dams on the Snake River in Hells Canyon.

Rejecting the application of the National Hells Canyon Association for a writ of certiorari has reaffirmed the authority delegated to the Federal Power Commission by Congress. For it was Congress that vested the Commission with the power and the responsibility to investigate and license hydroelectric projects on navigable, interstate streams. And it was Congress that directed that such determinations be made and licenses issued in the public interest on the basis of engineering and economic factors.

The Commission has given both proponents and opponents of Idaho Power Company's three-dam project ample opportunity to present the facts in public hearings. On the basis of these facts the Commission granted Idaho Power Company a license and in its decision said, in part: "It is our judgment that the United States itself should not undertake the development of the water resources of the Hells Canyon reach of the Snake River" and characterized the company's program as "best adapted to a comprehensive plan" for developing the river.

As we see it, in supporting this decision of the Federal Power Commission the Supreme Court obviously finds the Commission's determinations and decisions to have been made on an orderly fact-finding basis in the public interest and within the framework of authority delegated to it by Congress.

Viewed in this light the Hells Canyon decision is indeed a "triumph for the orderly process of government." But it is also a victory for Mr Roach and the Idaho Power Company that is well and richly deserved.

Yankee's Reactor: 3 Kinds of Safety

Yankee Atomic's Glenn Reed tells Massachusetts Safety Council meeting how the Rowe plant is being engineered for minimum hazards. AEC gets safety report

Yankee Atomic Electric Co is doing everything it can to make its proposed nuclear power plant at Rowe, Mass., safe for operating personnel and the public at large.

But what makes a reactor safe? To this question, Yankee's Glenn A. Reed had some answers on reactor safety at the Massachusetts Safety Council meeting in Boston recently.

His answers were taken from Yankee's Preliminary Hazards Summary Report recently forwarded to the Atomic Energy Commission's Reactor Hazards Evaluation staff in Washington.

Inherent Safety Cited

Reed points out that Yankee's pressurized water reactor has three kinds of safety: Inherent, man-made, and geographical.

The Yankee reactor is inherently safe—it tends to stabilize itself or shut itself down in a reactor transient. Three things contribute to this characteristic:

- A negative temperature coefficient of reactivity. When the light water moderator gets hot, it expands. When it expands, it slows the nuclear chain reaction.
- A negative Doppler coefficient of reactivity. This merely means that the uranium grabs neutrons from the chain reaction as an operator tries to increase power, or as the reactor tries to run away. This also slows the chain reaction.
- A negative void coefficient of reactivity. If steam bubbles form in the Yankee core by too high an increase in power, the voids thus created displace the moderator. This slows the reaction also.

Those three factors combine to make the uranium core mass inherently "lazy", Reed points out. But in addition, Yankee designers are putting two man-made control systems into the reactor.

The first will use solid control rods to penetrate the reactor core. They are to be controlled automatically and manually by about ten monitors which "police" the plant for trouble. A signal from any single monitor will "scram" the plant (shut it down).

The second control system is to employ in this reactor type for the first time a dissolved liquid poison for control. This is expected to yield better economies for this reactor type with no sacrifice in reactor safety, Reed said.

From the start, Yankee chose uranium oxide fuel. It does not react chemically with water. It also will help hold in check dangerous radioisotopes if a clad leak or incident does occur. It will do this by containing within its own matrix a large percentage of the isotopes.

In spite of a probable low leaching rate of radioisotopes from uranium oxide, Yankee will clad the 30,000 fuel columns with high-integrity stainless steel jackets. In view of inspection techniques and the radiation damage-resisting nature of the fuel, it is considered improbable that more than 100 tubes would develop a leak larger than a pinhole in a core cycle.

Closed Loop to Be Used

Yankee further has chosen a high-integrity closed loop for recirculating the moderator. It will use sealed canned-motor pumps.

In addition, a steel sphere is to enclose the reactor as a precaution —and to create a fourth sequential barrier to radioisotope escape—should a primary loop fail or leak.

The reactor's remote site creates a barrier against atomic hazard in the vicinity of the plant. The nearest occupied house is about ¾ mi away. But as an additional safeguard, the general area is to be policed continuously by monitoring stations. Normal plant operation will necessitate discharge of some "very low level" but carefully monitored radioactivity.

Texas Utilities Form A-Group

A program for research in the atomic power field was launched in the Southwest recently with the formation of Texas Atomic Energy Research Foundation.

The non-profit organization, composed of 11 utilities in the state, will "engage in research in the atomic energy field as applied to the generation of electric power," according to C. A. Tatum, Jr, president of Dallas Power & Light Co, a member of the new group.

The Foundation does not plan construction of an atomic energy power generating plant at present. Instead it will direct its activities toward research in fundamental methods involved in the use of atomic energy in steam-electric power plants of participants.

Foundation President W. A. Parish, also president of Houston Lighting & Power Co, said the group "does not plan to request any government funds to support its nuclear research program. It hopes, however, to work closely with the Atomic Energy Commission in any program it undertakes."

In addition to DP&L and HP&L, the Foundation's members include Central Power & Light Co, Community Public Service Co, El Paso Electric Co, Gulf States Utilities Co, Southwestern Gas & Electric Co, Southwestern Public Service Co, Texas Electric Service Co, Texas Power & Light Co, and West Texas Utilities Co.

SAYS U. S. WEATHERMAN Landsberg: "Cyclical variations do occur, but they don't contribute more than 10% to surface weather. The impulse may come from outside the earth—appearing in patterns but not in exact cycles . . ."

Can Heat Storms Be Predicted?

The U. S. Weather Bureau says it can't forecast them seasons ahead "at this time," but a private weather service says it can—with Univac's help

Can "heat storms" be forecast with accuracy?

The answer to this question lies in how many truths have been discovered in this relatively young, often-exasperating science of meteorology.

Men at the U. S. Weather Bureau in Washington say they "don't know how" to predict heat waves long in advance "at this time."

But Irving P. Krick Associates, a commercial weather service headquartered in Denver, said its Univac can predict "with good confidence" the occurrence of heat waves up to a year in advance.

However Krick Associates regretted that, due to a clause in its contract with a farm magazine, it could not release any 1957 heat-storm forecast for publication in Electrical World.

This will leave many utilities wondering if, when, and for how long their systems will be plagued this summer by heat storms—which bring on a heavy air-conditioning load when transformers and cables can least stand overloading.

One fact is inescapable: Meteorologists—federal and commercial—are working hard toward making accurate, long-range weather reports. A heavy demand exists for good advance weather information. Seemingly as a corollary, anyone who can foretell future weather better than the Weather Bureau stands to gain financially.

This may explain why commercial forecasters may shy from detailing their techniques at professional society meetings.

In an interview, Dr Helmut E. Landsberg, director of the U. S. Weather Bureau's office of climatology, described some of the tools developed by the Bureau that may be helpful to electric utilities. The first tool is a series of pamphlets presenting a "Summary of Hourly Observations" covering a five-year span in 118 scattered United States cities (available at 10¢ per city from Supt of Documents, Washington, D. C.). These may be useful guides to anticipating air-conditioning loads, Dr Landsberg said.

The St. Louis figures show, for instance, there were 626 hours in the Julys of 1950 to 1955 when the temperature hit 85. There were 1,316 July hours when the temperature climbed above 85. This averages 263 hours for each July, or

THIS PATTERN OF DISCOMFORT blanketed the United States on an average 3 PM during July of 1956. Comfort line is 70F; higher values mean air-conditioning

33% of the entire month.

"If the weather becomes uncomfortable a few hours now and then, people probably will tolerate it," said Dr Landsberg. "But if it becomes uncomfortable for as much as 10% of the time, then you can bet that every house with a refrigerator and television set will also have air-conditioning sooner or later."

Discomfort Index Useful

Dr Landsberg pulled out the Bureau's Weekly Weather and Crop Bulletin, March 25, 1957. "Here's something else," he said, pointing to an article by his associate, E. C. Thom. "We have a discomfort index which serves as another guide toward anticipating air-conditioning loads."

The discomfort index is the average of a dry-bulb and a wet-bulb thermometer reading. Below an average of 70F, the weather can be thought of as "comfortable." As the average climbs toward 85F, more and more persons will flick on room and building air-conditioners. At an average of 85F in the Washington, D. C., area—notoriously hot and muggy in the summer, government personnel in non-air-conditioned offices usually are dismissed because of their discomfort.

The Weather Bureau also publishes a 30-day outlook which estimates rainfall and temperatures, but not on a day-by-day basis. This outlook is published every 15 days, for the Weather Bureau admits it may be a little shaky on its far end. In contrast, the five-day forecast is specific.

Dr Landsberg said the Weather Bureau's longest-range prediction is the 30-day outlook, and that the Bureau is not able to predict heat storms a year ahead "at this time." Under pressure of deadlines, U. S. weathermen often wish they could hand out aspirin with some comparatively "simple" overnight forecasts, he said with a chuckle.

But a commercial forecaster tells a different story. Said Irving P. Krick: "We are able to predict with good confidence the occurrence of heat waves up to a year in advance. In some cases, we are able to predict when they will hit and how long they will last. By the same method we are able to predict approximately what areas will be most severely affected by the heat.

Univac Technique Is New

"However our forecasting technique, using the electronic computor Univac, is quite new. As this machine is devoted to analysis of weather for longer periods and more future weather solutions are derived from it, our confidence in predicting future heat waves increases accordingly," Dr Krick said.

"Basically the Univac is utilized in correlating known behavior of weather patterns with 50 years of historical weather data, and treating it all on the theory that the items that have the most influence on our atmosphere—such as the sun—move in orderly and predictable fashion.

"Although this method is relatively new, we have found good success with long-range forecasts that we have been able to verify within the limitations of time."

Dr Krick won his academic title in meteorology at Cal Tech, and was named head of the dept of meteorology by the late Dr Robert Millikan, then chairman of Cal Tech. During World War II, he served at Supreme Headquarters Allied Expeditionary Forces as chief of the long-range forecast and research section. He was one of four advisors on D-Day weather.

The Trouble with Trends . . .

Dr Landsberg, who describes himself as a "weather historian" for the Bureau, said weather records do reveal some periodicities, but so much remains unexplained that no conclusions for precise predictions can be drawn. About the time the researcher thinks he's discovered a trend, the "trend" reverses. This, he said, is typified by Dr Franz Baur's attempt to relate summer temperatures with maximum sunspot activity. Dr Baur, a reknown German meteorologist, extends himself only three months when forecasting.

For looking far into the weather future, weather records would have to be very old indeed to be of value. The oldest record in the U. S. (at New Haven, Conn.) is only 217 years long, and the oldest uninterrupted record is only 177 years long. The Weather Bureau now has many weather records compressed onto 300 million microfilmed punch cards for ready reference.

Certain cyclical occurrences do appear through these records, Dr Landsberg said, but the cyclical element wouldn't contribute more than 10% to long-range predictions.

A promising approach to long-range forecasting now seems to lie in mathematical interpretations of the entire earth's weather patterns. This is the direction in which the research and practicing meteorologist is now moving.

AEC Proposes Change in Licensing Rules

Amendment would require public airing—through hearings or advance notice—of all applications for construction permits and licenses for nuclear reactors

The Atomic Energy Commission is considering another rules change to bring its reactor licensing activities under closer public scrutiny.

The proposed change is one of several recently introduced to meet criticism of AEC's methods of handling licensing operations. The announcement came only a few days after issuance by the Joint Committee on Atomic Energy of a study on AEC's licensing procedures.

The new change is designed to give the public opportunity to study, before their issuance, proposed construction permits and licenses for nuclear reactors.

With some exception the amendment to the rules will make mandatory procedures which AEC has been following since last December. These procedures are that AEC, before issuing construction permits, shall on its own initiative either call a public hearing, or publish advance notice of its proposed action and allow 15 days for interested persons to request a hearing.

The mandatory features will not apply to export licenses.

The latest and other recent rules changes have gone far to meet Congressional criticism of AEC's operations.

Meanwhile, the case which started the whole reappraisal of the commission's licensing procedures, dragged on before AEC Hearing Examiner J. A. Kyle. Three labor unions which contested the AEC construction permit issued to Power Reactor Development Co on grounds of safety completed their cross-examination of the PRDC witnesses.

The case has now been adjourned until May 13 when the unions will present their own witnesses, not yet identified. Union Counsel Benjamin C. Sigal, will not confirm or deny reports that he plans to call some members of AEC's Reactor Safeguards Advisory Committee.

PRDC's final witnesses—Walter J. McCarthy, Jr, and Alfred Amorosi, both of Atomic Power Development Associates, Inc, affiliate of PRDC—gave assurance the PRDC reactor will be safe, when completed near Monroe, Mich.

New Compromise Brightens Niagara Outlook

Chances for enactment of legislation providing for Niagara power development appear brighter than at any time in the seven years the controversial issue has been before Congress. After three days of hearings before a Senate subcommittee, the once widely separated private and public power groups had resolved their differences down to one issue—the preference clause.

And even on this question, both camps modified their bills to accommodate a compromise.

This year, for the first time, there is no bill calling for either private or federal construction. The two bills before the Senate Public Works committee call for construction by the State of New York Power Authority.

Primarily responsible for bringing the two groups together was the rockslide last June that knocked out Niagara-Mohawk Power Corp's Schoellkopf hydro plant, resulting in a loss of 365,000 kw. This has injected a sense of urgency into Congressional consideration (EW, March 11, p 76).

The Republican-backed bill, introduced by New York Sens Irving Ives and Jacob Javits, calls for NYPA construction, but without the absolute preference provision found in the Democratic bill, sponsored by Sen Joe Clark of Pennsylvania and Rep Charles Buckley of New York.

Harriman to Back Bill

Last week Gov Averell Harriman of New York notified the committee of his backing of the Clark-Buckley bill, but said he would be willing to amend the bill to guarantee Niagara Mohawk 445,000 kw from the potential 1.8-million kw of the project to make up for the loss from the rockslide. This would be made contingent on Niagara-Mohawk giving up its own license to develop the power.

During the hearings, Sen Javits amended his bill to spell out preference for rural co-ops and municipal systems. He would call not only for allocating "reasonable amounts" of power for present and "reasonably foreseeable future needs," but also would include withdrawal provisions in contracts with industry and private utilities so that fractional amounts of power might later be recaptured to meet needs of the public groups.

Earlier NYPA Chairman Robert Moses had warned the committee that unless a "workable bill" without the federal preference provision was approved, NYPA would not be able to market the $600 million in bonds to finance the project.

Representatives of the private utilities involved testified in favor of construction by NYPA, but opposed inclusion of an absolute preference clause. Earle J. Machold, Niagara-Mohawk president, and Robert Ginna, president of Rochester Gas & Electric Corp, conceded they would accept—but not happily—a preference clause that allocated "reasonable" amounts to public groups.

THE NEWS-BEAT

It's a Radio Mirror

El Paso Electric Co has put a 20-ft square aluminum reflector on Monte Cristo Rey to bounce microwave signals from its Rio Grande plant directly to the Las Cruces sub-station 45 miles away, and vice versa. Made of ¼-in.-thick metal peppered with holes to reduce wind resistance, the mountain reflector does not amplify the radio signal. The microwave system can handle 25 functions ultimately, but it will be used first for voice communication and relay signals aimed at restoring service when trouble hits. Requiring no electric power, this passive reflector obviates repeater stations.

Dividends in People

Puget Sound Power & Light Co reaped unexpected dividends after moving its general offices from Seattle to Bellevue, heart of a fast-growing residential district across Lake Washington. This area has a high percentage of "working wives" who prefer to work nearby rather than commute to Seattle. Furthermore, job applicants are better qualified than previously because they come from better-class residential districts, the company reports.

Turbine Trading

Southwestern Gas & Electric may get its new 100-Mw unit into service at Lieberman plant by May 1 after all. A little turbine swapping helped offset the ten-month strike at Westinghouse Electric Co's South Philadelphia shops where the turbine was to be made.

As it turned out, Central Illinois Public Service Co had a turbine available in February that it couldn't use until May, due to tieups in structural steel for the building, and Southwestern had a turbine coming in May that it desperately needed in February. So J. Robert Welsh, Southwestern's president, negotiated a happy ending to this story with Marshall Luthringer, president of Central Illinois.

Of Rains & Tie Lines

The biggest block of generation to be dropped and picked up successfully—amounting to 485 Mw—was handled by Ohio Edison Co through its interconnections April 8 when rains undercut foundations and dropped one double-circuit 138-kv transmission line into another near Cadiz, Ohio. This effectively isolated the company's 500-Mw R. E. Burger generating station.

The accident, which followed prolonged rains in the area, occurred at 5:12 PM at time of daily peak load. Interconnections with Ohio Power Co, Cleveland Electric Illuminating Co, and Duquesne Light Co caught up the load instantly without interruption to a single customer. Largest voltage dip, according to an Ohio Edison spokesman, was six volts on a 120-v base. Frequency dipped to 59.92 cps.

Of the 485-Mw dropped, interconnections picked up 410 Mw. Largest part of this was picked up by Ohio Power Co which had interruptable contracts with several large customers.

Local Ingenuity

Two ingenious employees at Kentucky Utilities Co's Tyrone Generating Station have created a yoke-refacing machine out of scrap for revitalizing yokes from coal pulverizers. Weighing 2½ tons each, and measuring 6 ft in diam, the yokes now are refaced on a machine consisting of: A junkyard shaft, bearings from a scrapped locomotive crane, a spare motor from the coal scales, and a compound tool rest borrowed from the plant's shop lathe. The shaft was machined with reversible ends to accommodate yokes from smaller mills, reports W. R. Ormond, assistant supt at Tyrone. The refacer was created by Morris Wilder and Virgil Boggus, plant employees.

Copyrighted Predictions

Chugach Electric Assn of Anchorage, Alaska, copyrighted a recent financial report on its prospects in an unsuccessful effort to control publication of the report. The "Anchorage Times" said it got a copy that did not bear the copyright stamp. It published the main points. The report, said the Times, predicts a cumulative $1-million deficit for the association by 1962 if present rates and costs prevail. The deficit could be turned into a surplus equally large if a proposed management-improvement plan were adopted, according to the Times' story of the REA report.

Ah-Ha!

An irritated housewife recently called Tacoma, Wash., Dept of Public Utilities to complain that her electric bill was "too high." On the receiving end, Kathryn Kirkreit suggested that perhaps the lady had been heating her kitchen during early morning hours with her electric oven, or had been using small space heaters to add warmth to some of the rooms.

"No, I'm not doing that," the customer replied, "but I do use my electric toaster to heat the bathroom."

In and Out of Sessions at EEI Sales Conference Keynote Was . . .

Match Opportunities with Enthusiasm

- **Utility execs should back industry-wide programs to the hilt with company campaigns**
- **Keep telling the free enterprise story: Sell your company as well as your service**
- **Keep abreast of the times. Electronic sales, automation are here. Stop selling today's modern market with yesterday's methods.**
- **'Farm Better Electrically' program is launched. Outlook for rural market is good**

". . . Doubling of the electric energy load every ten years will not come 'just naturally', at least it has not come naturally in the past. It was brought about by developing new and improved products and services that the customer really needed and wanted. The challenge . . . is there in the form of rising curves of population and income. Your opportunity is to match these opportunities with your own rising curves of enthusiasm and performance in terms of creating and meeting demand for your product. . . ."

These words, by General Electric Co's market analyst E. J. Klock, captured the tenor of this year's 23rd EEI Sales Conference in Chicago.

But that's not all. Conferees were also pegged to take on some other jobs: Get behind a new rural market development program; put up a stiffer fight against government encroachment in the power business; and help make National Electrical Week bigger and better in 1958.

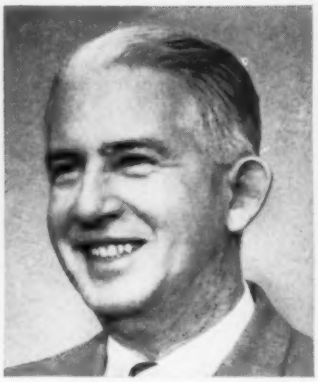
For farm market development: Atlantic City Electric Co's M. O. Whithed announced the new "Farm Better Electrically" program (EW, Mar. 11, p 114). Intended to be industry-wide, the infant FBE already has two sales tools: one booklet telling its story to the industry —the utilities, manufacturers, associations and others —and another to sell the program to the farmer. Farm Better Electrically will be to the farmer what Live Better Electrically is to the residential customer.

On government encroachment: Edwin Vennard, EEI vice president and managing director, told the conferees, "Things never looked so good for the electric industry. The only real threat to this bright future is that of government encroachment. Only by keeping America a land of free enterprise can the power companies expect to share in this future. So much of this responsibility rests with you as our contact with the customer. The industry is confident that you will meet this responsibility as you have met other responsibilities in the past." (Cleveland Electric Illuminating Co's R. M. Besse thinks that we can help guard against it by recruiting better people. Idea is to raise the level of the industry.)

Vennard also made the point that "we have no conflict with the co-ops, only the 'super co-ops' created by the government."

National Electrical Week: Union Electric's Merrill Skinner, chairman, National Electrical Week, cautioned utility men against missing an opportunity that presents both a challenge and a worthwhile result. Skinner contends the industry benefited greatly from observing NEW last year, and will even more so in the future. "National Electrical Week was conceived and has been

KENNEDY


McQUISTON

VENNARD

BABCOCK

developed with a very broad over-all purpose—namely, to focus attention on the contributions of electricity to our way of life. It is carried out as an 'umbrella activity' . . . as a beginning-of-the-year springboard for the various programs and educational or promotional objectives of the electrical industry." It goes further than the industry has gone before and will be observed again in February '58.

"Live Better Electrically" and "Housepower," the two big promotions that fairly dominated last year's conference, were given another series of healthy boosts. LBE staged a big spectacular, winding up the 4½-day affair. 1958 Live Better Electrically plans will be on their way to utilities, manufacturers and associations by September.

The electrical contractor is the "Third Man" in the manufacturer-power company team promoting "Housepower", R. W. Nicholson of Fuller, Smith & Ross told the Public Utility Advertising Assn luncheon.

Sales Tips from General Session:

- **Future opportunities will be great. Match them with drive and enthusiasm.**
- **Keep up the fight against government in the power business.**
- **Get behind "National Electrical Week."**

Citing a spot survey at a recent contractor's show, Nicholson said 98% of contractors interviewed knew about Housepower, and almost all of them were willing to take courses on how to promote it. Few knew about the housepower rating sheet. This points up a job that needs doing. Many reported that Housepower was taking up the slack in their business caused by the drop in housing starts last year.

Donald Kennedy, president of EEI and Oklahoma Gas & Electric Co, sounded the clarion on "selective selling"—avoid selling yourself broke by picking your industrial, residential and commercial sales so as to give the best return on common. Kennedy also thinks the importance of sales can be emphasized by giving the sales manager the same rank as the heads of the engineering and finance divisions. Tie your rate and sales departments closer together.

The next five years will be critical ones in the battle for residential and commercial loads, according to M. G. Kennedy of Ebasco. Space conditioning load will decide the winner. "I share with many utility executives the belief that he who controls the year round comfort conditioning can control the load of the entire home." Putting the right kinds of loads in the stores and homes will help solve the summer peak problem. One good way to do this is to push electric heating . . . now, before it's too late.

COMMERCIAL SALES: Rewiring and Gas Space Conditioning Will Be the Big Problems.

The competition is not asleep at the switch for space conditioning commercial sales, warned E. R. Ambrose, AG&E air conditioning boss. The gas boys are fast perfecting an absorption-type conditioner that uses 27 cu ft of gas per ton of refrigeration. The electric conditioner will probably keep the lead in 1957, but don't get complacent. Utilities must encourage manufacturers to put out better designs.

Above all, don't forget about trade allies! This from several quarters, among them Edwin Vennard and NECA president O. F. Burnett. The contractor is caught in the fight between utility and the residential customer. The former rarely lets him in on T&D and substation work, and the latter thinks in terms of an "electrician"—a handy man—rather than a reliable contractor who can give him the engineering services he needs.

With 85% of the nation's stores needing improved lighting, and another 40% needing air conditioning, the future base of commercial sales lies solidly in rewiring, said Ed George of Detroit Ed. In the next ten years there will be a whopping $22½ billion market in rewiring just waiting to be tapped. Don't forget about the rewiring in apartments and other multiple dwellings, and the $150 million school re-wiring market.

Turn on the Heat in Schools

Speaking of schools, utilities are sitting up and taking notice of electric heating in them. It's a pretty attractive picture that Edwin L. Wiegand's C. F. Kreiser paints. School heating is generally an off-peak

ROYALL

AYERS

SKINNER

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load. Heat is on only about 15% of the school hours because lights and students build-up the heat gain to required levels. (In this connection, utilities should keep on eye on the school shortage problem. Schools may eventually have to go to a 3-semester, 12-month schedule. This can pave the way for school space conditioning.)

In his "yardsticks for Commercial Sales" speech, Middle West Service Co's M. R. Rodgers pointed out the three factors utility execs must watch:

1. Drop in load factor
2. Drop in the percent earned by utilities
3. The high cost of money

Concentrate on improving load factor. Use appliances that offer a high return to offset cost of money. By 1965 Middle West predicts 30 states representing 71% of total industry load will have summer peaks.

Commercial Sales Highlights:

- **Work on store rewiring.**
- **Watch the school situation. Space heating in them may be better than you think.**
- **Offset high cost of money with high-return appliances and commercial cooking.**

Don't forget about commercial cooking. It also is a good high-return load says Hotpoint's W. C. Ayers and EIP's D. W. Grosshandler. Commercial cooking promotion can't be split up; manufacturer and utility have to do it together. It offers an average of $26 per installed kw for the manufacturer and $25-$40 for the power company.

RESIDENTIAL SALES: Market Is Ready for "Big" Sales—Sell the Kitchen as a Package.

Residential sales are still the backbone of the industry. The market is ready for "big" sales, said Edwin Vennard. He went on to outline a program for selling in today's rapidly changing market:

- Selling the entire kitchen as a package, not piecemeal, appliance by appliance. "It isn't much harder to sell a $3,000 kitchen than it is a $300 refrigerator." (Architects, designers and furniture men are thinking of selling the entire house as a unit with the customer saying what he wants before it is even built!)
- New appliances are being developed all the time. Fifteen new ones have come on the market in the last ten years. Sell them. They're good load builders. Among the best: the 2-zone refrigerator and the food.

These For Bigger Residential Sales:

- **Support "Housepower" and "Live Better Electrically."**
- **Sell "big" in the market. Sell the kitchen as a package, not piecemeal.**
- **Woo Your Dealers With Better Promotions**

- Give "Live Better Electrically" the support it deserves. Same thing for "housepower." Develop them to the point where they are regarded as a great contribution to our way of life.
- Don't let lighting become a stepchild. The Better Light—Better Sight Bureau should be backed. Utilities should develop lighting sales programs of their own, as they had prior to World War II.

Utilities and the industry generally are not paying enough attention to coordination. Promotion programs have to be tied together. LBE is an ideal medium for doing things this way, according to Detroit Edison's E. J. Hurley. Said Hurley, "The Live Better Electrically" message is like a symphony. And the manufacturers, utilities, dealers, distributors are all sections of the orchestra. Maestro Coordination is the leader. Discord and noise are all we get unless he directs it."

Woo your dealers with promotion that ties in well with his and that promotes his interests as well as yours. That's the gist of remarks by H. B. Price, Jr., appliance dealer of Norfolk, Va. Last year dealers operated at a net of only 3.4% . . . not a very big return, Price thinks, for the service dealers render their customers and the effort that goes into that service. Utilities can and must give more help.

FARM SALES: 'Farm Better Electrically' Is the Big News—Support It!

"Farm Better Electrically" dominated the farm sales story this year. Kilowatt-hours have got to take the

EEI's 1956 Award Winners . . .

Here are the 22 winners for lighting, residential, industrial, rural, and commercial cooking sales and promotion

THOMAS W. MARTIN AWARD Rural Electrification: G. W. Ousler, chairman of EEI Awards Committee; P. R. Schepers, Consumers Power Co; and E. C. Easter, Alabama Power Co

place of man-hours according to Farm Journal editor R. J. Babcock, because . . .

- The number of farms in the U. S. is steadily going down. The 4¾ million farms will shrink to 4 million in the next twenty years.
- But population is growing. There'll be fewer farmers to feed more mouths. Today the farmer takes care of 35 people; in 20 years he'll have to handle 52. More electrically driven machines is the answer.

Farm Sales Tips:

- **Get behind "Farm Better Electrically." Push farm consumption to 10,000 kwhr.**
- **Growing population make greater farm productivity necessary. Electricity is answer**
- **Push kwhr consumption for animals**

FBE is aimed at increasing in ten years the average farm consumption to 10,000 kwhr; today it's only 3,650. Such a figure is no pie in the sky. The market's there. In the five years ending 1960, farmers will have spent $5½ billions for electrical equipment—about $3 million a day!

Utility-farmer relations haven't always been the best, especially during the thirties. American Farm Bureau Federation President C. B. Shuman, claims "Utilities must share the blame for this. Through lack of means or enthusiasm, they failed to serve the rural farmer as he wanted and needed to be served."

Alabama Power Co's E. C. "Pappy" Easter told the farm group that "We should sell the farm home and the farm operation together." And they were urged by GE's J. H. Oliver not to rest easy until they have even the animals living better electrically: 600 kwhr per year for each cow; 4 kwhr per year for each laying hen; 50 kwhr for every ton of hay harvested; 2 kwhr for every bushel of corn binned, etc.

INDUSTRIAL SALES: Automation Is Boosting the Industrial Load Rapidly. Promote it solidly

The most important factor affecting industrial sales will be automation. Edwin Vennard warned that we better start thinking about plant distribution systems made inadequate by this trend. It's especially true of smaller plants. The Industrial Electrification Council saw this awhile back and is now working to overcome it. Vennard and Cincinnati G&E's Frank Wiatt told utility men to back IEC's industrial heating course.

In '57, $3 billion is earmarked for industrial building. Right now we're in the middle of the biggest building boom in our history, said F. W. Dodge Corp Vice President G. C. Smith, and it will get bigger.

Can we adopt mass market techniques to our industrial market?

Yes, thinks Westinghouse's P. T. Lagrone, but it will mean new thinking about equipment and apparatus. The answer probably lies in standardization of many industrial items.

Lighting is a good cash-register item in industrial sales. "We're in a 50-ft-candle rut," says George Taylor of Daybrite. Utilities must plug for the higher levels. We're at the 100-ft candle brink now, and 500 is not too far fetched in 15 years. Utilities should work toward the goal of 20-25 w per sq ft of industiral space.

Getting back for a look at industrial heating possibilities . . .

- In five years, a 2.1 kw hike throughout the industry can mean $54.6 million in additional EAR.
- Electric heating loads of all kinds will total 37.7 million kw and will mean $4.1 billion EAR by 1965.

Industrial Sales Helps:

- **Automation is a good booster of industrial sales. Stay with it**
- **Lighting is a good item. Reach for higher ft-candle levels in industry. Promote 100 ft-candles now.**
- **Promote industrial heating**

EEI's Chairman of Commercial Division Executive Committee T. O. McQuiston, chairman, highlighted the jobs done by his outfit during the past year. Briefly:

- The power sales handbook has been revised.
- Electric heating handbooks (resistance heating and heat pumps) are now available.

But the picture is not all rosy. There are some things McQuiston doesn't like. He called strongly for:

- A study of the "sick" water heater business. Utilities have asked for too many models.
- More explicit instruction by utilities to EEI.

LIGHTING EDUCATION AWARD: G. W. Ousler; Mrs Doris McCutcheon, Central Illinois Light Co, takes the award for Div B; H. A. Stroud, Better Light Better Sight Bureau

LIGHTING PROMOTION AWARD: G. W. Ousler; J. B. Deck, Jr, Texas Power & Light Co; J. C. Forbes, GE; A. S. Gilbert, Idaho Power Co, and Garland Morse, Sylvania Electric

LIGHTING EDUCATION AWARD: In Div A, G. W. Ousler; Ralph J. Phillips, San Diego Gas & Electric Co; and H. A. Stroud, Better Light Better Sight Bureau

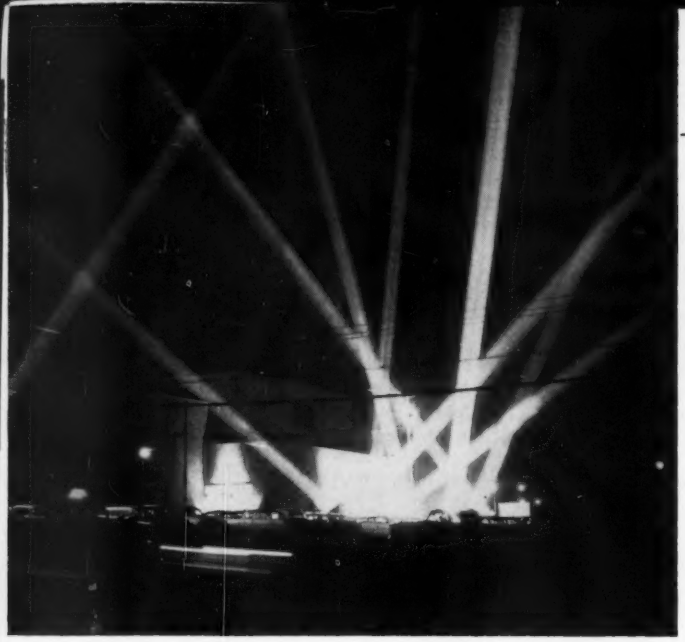
GEORGE A. HUGHES AWARD: J. H. Keele, FP&L; C. W. Ailstock, FPC; R. Layfield, GPCO; B. Plowman, WWP; J. H. Mead, So Cal Ed; and J. A. Bell, Hotpoint Co, donor

GEORGE WESTINGHOUSE AWARDS for automatic laundry promotion: G. W. Ousler; L. A. Duckworth, NY State G&E (2nd prize); W. T. Clark, CEI (1st prize); J. Lee, Westinghouse

LAURA McCALL AWARDS for home service work: Nora Stegg, KG&E; Amy Thompson, FPC; Suzzanne Wofford, MP&L; Mildred Ditzel, DP&L; Marguerite Fenner, PG&E

MORE POWER TO AMERICA AWARD for industrial electrification: G. W. Ousler; J. C. Aull, IP&L; G. R. Black, WEPCO; and Karl Runkle, General Electric Co, donor

FRANK WATTS AWARD for rural promotion: C. W. Ousler; D. Garber, Dayton P&L; N. B. Penn, Alabama Power Co; Bud Moss, Georgia Power; R. J. Babcock, Farm Journal, donor



Do Industry Fairs Pay? Cincinnati Says 'And How!'

- **Electric industry teams up to capture share of customer dollar and sell better living theme**
- **Manufacturers, distributors, and dealers enthusiastic over sales and prospects**
- **'Home in the Clouds' intrigues 75,000**

EDWARD W. HODGETTS, Director, Promotion, Advertising and Publicity, Cincinnati Gas & Electric Co, Cincinnati, Ohio

Does an annual exposition of the electrical industry's wares pay off? On the basis of Cincinnati's "Electric Living Exposition of 1957," the answer is an emphatic "and how."

Manufacturers, distributors, dealers, and other trade allies are, almost without exception, reacting enthusiastically about their sales, prospect lists, and tremendous press coverage accorded the nine-day show.

The only negative reports were from two exhibitors who complained because of too much activity. It seems adjoining demonstrations caused spectators to overflow into their space.

The payoff can be measured several ways. First, an effort like this solidifies the whole industry to accomplish an objective. Next, it generates tremendous press coverage which the industry normally wouldn't get.

An exposition enables merchandisers of electrical living to compete with auto shows, home shows, and other promotions struggling to get a part of the consumer dollar. It enables the utility and the nationally known exhibitors to tell aggressively the story of electrical living.

Then, of course, there are the immediate results—sales. Hundreds were made directly during the exposition. But the big potential is prospects; ones who gave their names and addresses, and who are now receiving calls and literature. And there are the others who came, saw, and were conquered. They're buying the merchandise at their favorite stores.

By actual count, more than 75,000 persons visited the show. Opening day attendance was a whopping 20,100—a new Gardens record.

How did exhibitors like it? For some typical comments see the box on page 52.

The Cincinnati exposition followed these ground rules: Promotional tactics of a circus; excitement of an opening night of a Broadway hit; exhibits of a World's Fair; and, the effort and energy of scores of people. The result? Says one dealer: "It was a little tough on the feet and legs, but truly an excellent show in every respect."

Cincinnati played host to many successful electrical exposition back in the Thirties. They were a vital factor in putting the area well ahead of national averages of appliance saturation, but were discontinued during the war. Later, postwar conditions did not require them.

The city's electrical leaders, taking note of tremendous advances in everything electrical during the past 10 years, realized it was a "must" to show off everything for the home in a show of great scope and completeness.

Planners Said 'No Industrial Items Allowed'

Planners insisted that only electrically operated items should be exhibited. They ruled out highly technical industrial items. It was to be strictly a show that Mr. and Mrs. Cincinnati would enjoy, and one to show them the many modern conveniences available.

Greater Cincinnati electrical dealers were enthusiastic and anxious to be a part. Meetings were held, committees were formed, and the complex mechanism necessary to put over a really "big" electrical show began rolling in high gear.

Deciding on a location wasn't difficult. Massive, modernistic Cincinnati Gardens offered excellent facilities, easy accessibility, and plenty of parking space.

A "Free Admission—Free Parking" feature did much to bring out people who ordinarily shun shows

of this type because they do not believe in paying to see an advertising promotion. The show actually attracted a higher-average income group than would normally be the case.

Importance of newspaper publicity was recognized by the exposition committee. Each of three Cincinnati dailies was approached regarding coverage for the exposition. All were enthusiastic in pledging stories, contests, and special sections.

All Media Pass the Word

The publicity mill was grinding for many weeks before the opening. Billboards and carcards were the first signs of activity. Later, heavy newspaper coverage, radio, television and other media joined in the effort. Mayor Charles P. Taft of Cincinnati officially proclaimed the week of the show, "Electric Living Week." Mayor Taft was joined by 42 mayors of outlying communities in proclaiming the week. Appropriate publicity appeared in the city's dailies and community papers.

Greater Cincinnati women's organizations were invited to come to the exposition during the 2 to 6 PM period, and were given added inducements to attend during the afternoon. Some 75,000 coupons were sent to 1,500 women's organizations, to be turned in Monday through Friday from 2 to 6 PM at the exposition. Each day five coupons were drawn and electrical gifts awarded. At the end of the show, two coupons were drawn, and those organizations received $100 each for their club treasury. All coupons were redeemable at 5¢ each at the end of the exposition. Response was heavy during what otherwise might have been a dull period.

'Electrifying' Tribute on February 11

All three Cincinnati television stations participated in National Electrical Week by selecting their "Most Electrifying Personality." The personalities were presented with handsome plaques in appropriate ceremonies on their TV shows. These presentations were made on Edison's birthday by various members of the Electric Living Exposition committee.

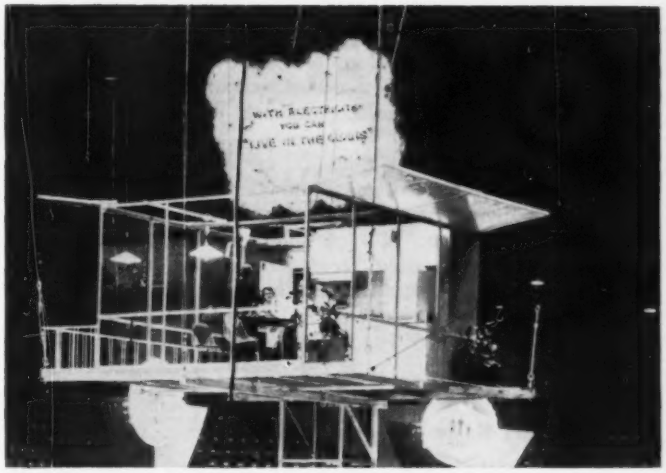
For several weeks in advance, members of the space sales committee, led by "Bud" Johnson of Johnson Electric Co, were busy contacting electrical dealers in the area, telling them all about the show and urging them to participate. A total of 125 exhibitors displayed hundreds of electrical appliances and pieces of electrical equipment for the home.

The opening ceremonies were preceded by a luncheon. Mayor and Mrs. Taft attended this and opening ceremonies, as well as William A. Carroll, assistant director of commerce, representing the governor's office; Jack Bogdan, president of the Cincinnati Electrical Association, committee chairman; and representatives of the press, radio and television. Just before 2 PM, the Mayor cut the ribbon—with electric scissors, of course.

On the first nights, Saturday and Sunday, Feb. 9-10, virtually all of Greater Cincinnati was treated to a display of nine searchlights. Five searchlights were in operation each evening during the show.

The Cincinnati G&E booth, occupying almost the entire west end, featured an LBE game. Similar to

A-BUILDING: Workmen add final touches to "Home in the Clouds." Made of aluminum and transparent plastic, it replaced a 5,000-lb scoreboard and timer for the exposition



ALOFT: Contest-winning couples took turns living here for three days each while crowds below viewed them and exhibits. Their reward: $1,000 worth of new appliances

ELECTRIFYING PERSONALITIES: During NEW, TV stations picked performers as "Most Electrifying." WLW-TV's Ruth Lyons gets her plaque from the author, Edward Hodgetts

amusement park poker machines, the game was played with four balls. Each rolled into one of 36 holes, lighting up corresponding space on the backboard of the game. The board had six LBE emblems and five each of an Electric Penny emblem, as well as television sets, dishwashers, ranges, clothes-dryers, and electric clocks.

Players received a 150-w light bulb for two of the same appliance plus the LBE or Electric Penny symbol, and a big bag of bulbs for two of a kind and both symbols. CG&E sales counselors manned the games and told the LBE and Housepower stories to all who played. The LBE game was one of the show's most popular features.

Exhibitors Showed Everything New

Novel exhibits were featured. Some 125 exhibitors displayed hundreds of electrical items, ranging from hand dryers to electronic ranges and from shavers to huge "do-it-yourself" items.

Visitors saw shirts ironed in 3 min; heard true high fidelity with the use of dual-track tape recordings; saw color television; sampled hot dogs and other delicacies prepared in seconds on electronic ranges; and watched do-it-yourself experts design intricate patterns in wood. Everything new in the electrical industry was on display.

The amount of time and effort among hundreds of people connected with a show of the scope of the Electric Living Exposition is tremendous. But the feeling of satisfaction, "of a job well done," and of the definite fulfilling of a need, far outshadows the hours of work necessary to put a show of this type over.

The nationwide electrical industry must realize the necessity of keeping the public constantly aware of the many new advances in the industry. The need for promotions of this type is great.

Cloud Home—an Interest Provoker

There's a need, too, for the attention getters used in the automobile and trade shows. This was the objective of the "Home in the Clouds" idea. We feel it accomplished our aim with better than average success. When first proposed, though, here are some of the questions that needed answers:

"Do you think we really can build it?" "Can the rafters support it?" "Transparent plastic? Well, I don't know . . ." "How about the cost?"

These points were raised at a meeting of the Cincinnati Electrical Association six months ahead of the exposition. CG&E Vice President J. R. Hartman, chairman of the Electric Living Exposition, and members of the association talked the proposal over at length and agreed the idea would help make the show a success.

The home was envisioned not as a showpiece, but as a place that could actually be lived in. Here's how it came to be:

Construction plans were worked up by two CG&E men—John Tishaus and Dick Van Veen. A sign company's bid to build the home was accepted.

The city's three newspapers undertook individual contests to find occupants. Winners were chosen for the best answers to "We would like to live in the Home in the Clouds because . . ." in the usual 25 words or less. The lure—$1,000 worth of electrical appliances—brought 3,600 entries. Three winning couples took up residence for three days each. Either the husband or wife had to be on hand from 2 to 10 PM so the audience could see them enjoying the home's all-electric advantages.

One stumbling block was getting the high-flying abode up in the air. To locate it in the center of the arena, workmen devised a rig to lower an 8-ft-sq timer weighing some 5,000 lb and raise the aluminum and plexiglass home. A small elevator solved the entrance-exit problem. Public interest was heightened by TV coverage of the aerial lift. Despite "walking on air" and "goldfish bowl" reactions, the three couples settled down to near normal living.

They had the advantage of a new refrigerator, TV, fry pan, toaster, percolator, mixers, range hood, wall and floor lamps, clocks, and door chimes. Each couple received these electrical gifts plus an iron, an electric blanket, and shavers for the husband and wife.

Visitors could see the winners from all angles. A closed-circuit TV camera in the home provided close-ups on a 21-in. monitor on the Gardens floor. And an intercom setup let the couples answer questions on niceties of "living in the clouds."

The high-flying home helped us achieve our long-range goal—getting as many people as possible "into the act." We want people to discuss what we are doing while they are riding the buses; while they are at dinner tables; and while they are at work and play. The response to the Cincinnati exposition proves it can be done.

Here's How Exhibitors Liked the Show

- "Terrific—best show we have had the pleasure of being in."
- "Visitors in general expressed an unusual amount of interest."
- "It's great!"
- "The crowds were outstanding, both in quantity and quality . . . The high type of patronage which you were able to draw . . . was certainly a tribute to the committee."
- "Best show we have seen in a long time."
- "Invaluable consumer exposure. The privilege of being a part is appreciated."
- "We received excellent exposure per dollar spent and were very satisfied with the results . . ."
- "————, who manned our booth, reported he has enough leads to keep him busy for the next six months."
- ". . . One of the better shows. The over-all attitude of management toward exhibitors is commendable and encourages closer cooperation."
- "Results were very good. Increased store traffic and sales as a direct result of this display . . ."

How to Save Transformer Capacity

Study of diversified demand provides more economical basis for design of transformer and secondary capacity

R. W. BAKER, Chief Distribution Engineer, Georgia Power Co, Atlanta, Ga.

An economic study has produced a set of curves that are providing Georgia Power Co with a more economical basis for designing distribution transformer and secondary capacity. The curves plot coincident diversified demand against number of customers for five types of residential loads.

For the past 10 years the company has used similar curves for distribution design. Employing the curves to estimate demands, Georgia Power installed transformers with an initial loading of 100% and changed out at 150%. This practice resulted in less than a 0.5% failure rate caused by overloads. In view of this very low rate, a study was instigated to check the accuracy of the old data and to determine whether additional thermal capacity was available in the transformers.

The study was made from demand charts taken for a week or more during the summer of 1954 on 232 residential customers selected from the entire kwhr usage range and service area. The charts were made with 30-min-interval integrating-type recording demand meters. The customers were divided into five types:

1. Lights, refrigerator, and/or miscellaneous appliances.

2. Lights, refrigerator, miscellaneous appliances, range.

3. Lights, refrigerator, miscellaneous appliances, water heater.

4. Lights, refrigerator, miscellaneous appliances, range, water heater.

5. Lights, refrigerator, miscellaneous appliances, range, water heater, and automatic washing machine.

A comparison of kwhr usage during the test week and during two monthly billing periods indicated some customers did not have normal usage during the test period. For this and other reasons, 88 of the low usage and least desirable charts were eliminated, and the 144 remaining customers were basis of the study. Table I lists these customers, along with appliances, kwhr usage, and demand data.

Demand charts were combined by types into groups of 2, 4, 8, 16, and 32 customers to simulate demands on secondary buses. To explain this procedure, let us select the eight customers in Type 5 with the largest individual demands. This group contained the only three who had clothes dryers.

Demand curves for the clothes-dryer customers were combined with another curve of similar characteristics, and two two-customer groups were formed. These four customer demands were then combined into a composite demand curve. This composite curve was grouped with one for another four-customer group to give an eight-customer group. Table II presents the data accumulated by this procedure.

To illustrate further the full range of this method, data for the 18 eight-customer groups in the study are in Table III. This gives

Table I—Customer Appliances and Load Data

	Customer Types*				
	1	2	3	4	5
No. of Customers	32	32	16	32	32
No. of Appliances					
Refrigerator	30	32	16	31	31
Range	0	32	0	32	32
Water heater	0	0	16	32	32
Conv. electric washer	14	17	6	18	1
Auto. electric washer	2	7	4	0	32
Electric dryer	0	0	0	0	3
Room air conditioner	0	0	2	2	0
House heat (partial or all)	0	2	1	1	0
Television	14	15	10	17	25
Water pump	1	5	1	10	5
Home freezer	2	3	4	1	9
Dishwasher	0	1	0	0	3
Garbage disposal	0	0	0	1	0
Central air conditioner	0	1	0	0	0
Attic fan	1	4	3	5	4
Avg kwhr/customer during test period	35.0	62.6	98.7	95.5	159.0
Group coincident avg kw demand/customer	.50	.80	1.22	1.15	1.73
Percent load factor	54.7%	61.4%	63.2%	64.2%	71.7%

*See accompanying text for description of customer types.

Table II—Load Data for Eight Type-5 Customers

	1-Customer Groups	2-Customer Groups	4-Customer Groups	8-Customer Groups
Test week kwhr	1,626	1,626	1,626	1,626
Total max kw demands	49.17 (8)	34.40 (4)	25.16 (2)	23.74 (1)
Average max kw demand/customer	6.15	4.30	3.15	2.97
Percent coincidence factor [1]	100%	70%	51%	48%
Percent load factor [2]	19.7%	28.1%	38.5%	40.9%

[1] Coincidence factor is the ratio of the maximum diversified coincident demand of a group of customers to the maximum total of the non-coincident demands of customers in the group.
[2] Load factor is the ratio of the actual test period kwhr consumption to the product of the maximum demand and hours in the period.

Adapted from a paper presented before Engineering & Operation Section, Southeastern Electric Exchange.

Table III—Summary of Data for 8-Customer Groups and Individual Customer Averages for All Groups

	Customer Type Number 1	2	3	4	5	50% 1 50% 4	50% 1 50% 5
8-Customer Groups							
A. Test period kwhr	163.67	362.89	732.36	652.50	1181.38	408.08	672.57
Group kw demand	2.91	10.62	11.76	11.43	18.60	7.23	11.22
Load factor—%	33.5%	20.3%	37.1%	34.0%	37.8%	33.6%	35.5%
B. Test period kwhr	211.24	416.26	846.93	838.35	1157.66	524.80	684.45
Group kw demand	3.27	8.28	14.16	13.50	22.32	10.05	13.26
Load factor—%	38.5%	29.9%	35.6%	37.0%	30.9%	31.1%	30.7%
C. Test period kwhr	315.54	523.46	.....	757.76	1128.34	536.70	721.94
Group kw demand	4.87	11.10	.....	12.38	16.80	9.26	10.92
Load factor—%	38.6%	28.1%	.....	36.4%	40.0%	34.5%	39.4%
D Test period kwhr	387.25	702.97	.....	819.84	1626.25	603.55	1006.75
Group kw demand	7.79	12.30	.....	13.80	23.74	9.83	13.68
Load factor—%	29.6%	34.0%	.....	35.4%	40.8%	36.5%	43.8%
Totals and Averages for 8-Customer Groups							
Total test period kwhr	1077.70	2005.58	1579.29	3068.45	5093.63	2073.13	3085.66
Total group kw demands	18.84	42.30	25.92	51.09	81.46	36.37	49.11
Average load factor —%	34.0%	28.2%	36.3%	35.0%	37.2%	33.9%	37.4%
Average kw demands per 8-customer group	4.71	10.58	12.96	12.77	20.37	9.09	12.28
per customer in group	.59	1.32	1.62	1.60	2.55	1.14	1.54
Customer Averages							
Average test period kwhr	33.7	62.7	98.7	95.9	159.2	64.8	96.4
Estimated average kwhr/month	150	280	400	400	700	280	400
Average kw demands							
Non-coincident per customer	1.08	3.31	3.34	4.00	4.76	(2.54)	(2.88)
2-customer groups	.87	2.40	2.42	2.89	3.70	2.20	2.56
4-customer groups	.73	1.74	1.91	2.02	2.83	1.59	1.97
8-customer groups	.59	1.32	1.62	1.59	2.54	1.14	1.53
16-customer groups	.53	1.03	1.22	1.36	1.92	.93	1.38
32-customers	.50	.80	.....	1.15	1.73	.80	1.11

Table IV—Cumulative Kva Demands for Various Customer Types

No. of Customers	Type 1	Type 2	Type 3	Ordinary Users Types 1 & 4 50% each	Type 4	Heavy Users Types 1 & 5 50% each	Type 5
1	1.19	3.64	3.67	....	4.40	....	5.24
2	1.90	5.24	5.58	4.93	6.34	5.72	8.16
3	2.53	6.55	7.14	6.14	7.77	7.46	10.59
4	3.08	7.72	8.51	7.08	9.15	9.02	12.80
5	3.62	8.78	9.79	7.92	10.51	10.52	14.85
6	4.16	9.77	10.99	8.71	11.83	11.92	16.82
7	4.69	10.72	12.12	9.51	13.14	13.29	18.69
8	5.23	11.64	13.21	10.25	14.43	14.61	20.50
9	5.76	12.53	14.27	11.01	15.71	15.90	22.29
10	6.30	13.39	15.34	11.76	16.98	17.16	24.07
11	6.83	14.23	16.40	12.50	18.26	18.37	25.85
12	7.37	15.04	17.47	13.24	19.54	19.58	27.63
13	7.90	15.84	18.53	13.98	20.81	20.77	29.41
14	8.44	16.63	19.59	14.71	22.09	21.96	31.20
15	8.97	17.43	20.66	15.43	23.36	23.13	32.98
16	9.50	18.23	21.72	16.16	24.64	24.30	34.76
17	10.04	19.03	22.78	16.87	25.92	25.43	36.54
18	10.57	19.82	23.85	17.59	27.19	26.58	38.32
19	11.11	20.62	24.91	18.30	28.47	27.72	40.11
20	11.64	21.42	25.98	19.02	29.74	28.86	41.89
30	16.99	29.39	36.61	26.17	42.50	40.30	59.71
40	22.34	37.37	47.25	33.32	55.26	51.74	77.53
50	27.68	45.34	57.89	40.47	68.02	63.28	95.35
100	54.41	85.22	111.07	76.22	131.82	120.38	184.45
Approximate kwhr/year	1,800	3,360	4,800	3,360	4,800	4,800	8,400

kwhr usage and kw demand and indicates how customer averages are calculated.

Individual customer average kw demands in Table III were adjusted to conform approximately to a mathematical formula (C. W. Bary's AIEE paper, Vol 64, 1945) and to make a smooth average curve. Resulting values were converted to kva by assuming a power factor of 90.9%. These adjusted values of kva for the five types of customers are plotted in Fig 1.

From these curves, percent coincidence factors for each customer type were calculated and plotted in Figs 2 and 3. These curves will be helpful when individual customer demand increases. For example, a high-wattage water heater is expected to increase the customer demand about 1 kw above that of a standard ASA water heater. In this case, the new diversified demand curve would be the product of the increased individual demand and the coincidence factors for that type of customer.

These data are extended in Table IV which shows the average diversified customer demand multiplied by the number of customers. Also incorporated are two columns of demands for customers with 50% saturation of ranges and water heaters. Data in this form are easy for field men to use. For practical applications, however, it is expected that the table will be simplified to four columns by averaging the two 3,360 kwhr per year columns and the three 4,800 kwhr per year columns.

Clothes dryers, room air conditioners, central air conditioning, heat pumps, and house heating cause problems in estimating demands. To evaluate these demands it was necessary to rely on published tests and meager field data.

This study covers a 10% saturation of clothes dryers in Type 5 customer data. The 29 customers without dryers show an average maximum demand of 4.48 kw, while the three customers with dryers have an average maximum demand of 7.46 kw. This indicates that 3 kw is required for individual dryers.

Tests on high-wattage (6 to 10 kw) clothes dryers are being made. Figs 4 and 5 are demand curves for transformer buses supplying one

metered high-wattage clothes dryer each, as well as other appliances, for 16 and six-customer groups. The demand of the clothes dryer was subtracted from the entire demand and plotted in dotted lines with small arrows indicating the reduced peaks.

The high-wattage dryer in Fig 4 had a maximum demand of 4.1 kw but was not on during the transformer peak. The dryer in Fig 5 was included in six peaks, the maximum being 11.5 kw. But subtracting the dryer demand gives a peak of 8.9 kw. Thus, the dryer with a metered maximum demand of 5.5 kw produced a peak only 2.6 kw larger than without the dryer.

Other tests and published data show 4.2 to 5.1-kw demands (EW, March 19, 1956, p 123). But, considering diversity among other loads and the dryer in one household, 3 kw should be an adequate allowance for the ordinary dryer and 4.5 kw for the high-wattage dryer. Available reports support the use of the coincidence factor curve (Fig 2A) for extending these values for more than one dryer per secondary bus.

Room air conditioners, heat pumps, central air conditioning, and space heating show some diversity among like units. The full connected demand of a unit of air conditioning should be expected on top of the peak of other appliances. Therefore the single-unit demand allowance should be the connected demand.

Space heating and auxiliary house heating with a heat pump will not apply maximum demands on the peaks of other appliances. Also, because published tests indicate that the maximum heating demand is normally less than 90% of installed capacity, it seems justified to provide a single-installation demand allowance of 80% of rated capacity. A coincidence factor of 86% for 25 units seems to be a fair average for these loads. With this value as a guide, the coincidence factor curve (Fig 3C) should serve to extend single-demand allowances to two or more units on a secondary bus, until more conclusive data is available.

Group demands listed in Table IV with added demands for clothes dryers, air conditioning, and house heating give the average maximum

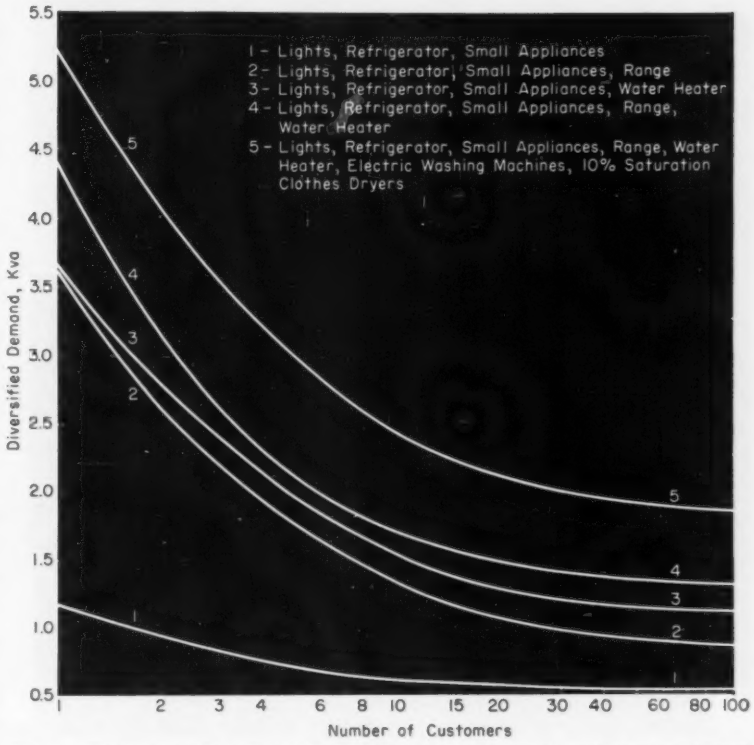

1 - Lights, Refrigerator, Small Appliances
2 - Lights, Refrigerator, Small Appliances, Range
3 - Lights, Refrigerator, Small Appliances, Water Heater
4 - Lights, Refrigerator, Small Appliances, Range, Water Heater
5 - Lights, Refrigerator, Small Appliances, Range, Water Heater, Electric Washing Machines, 10% Saturation Clothes Dryers
Diversified Demand, Kva
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
1 2 3 4 6 8 10 15 20 30 40 60 80 100
Number of Customers

FIG 1—DIVERSIFIED KVA DEMAND CURVES for five types of customers are based on the kwhr use and kw demand in Table III for 18 eight-customer groups

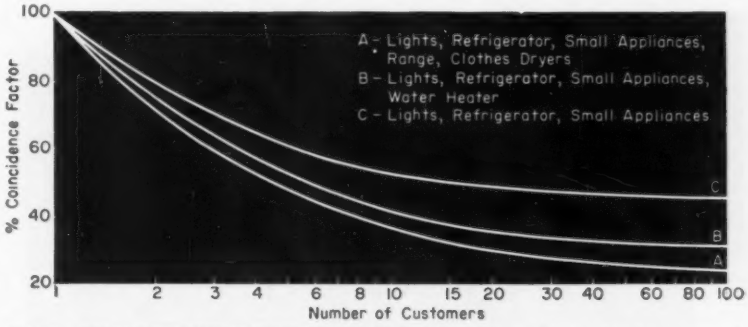

A - Lights, Refrigerator, Small Appliances, Range, Clothes Dryers
B - Lights, Refrigerator, Small Appliances, Water Heater
C - Lights, Refrigerator, Small Appliances
% Coincidence Factor
100
80
60
40
20
1 2 3 4 6 8 10 15 20 30 40 60 80 100
Number of Customers

FIG 2—PERCENT COINCIDENCE FACTORS for various customer loads were calculated from Fig 1. They help when individual customer demand increases

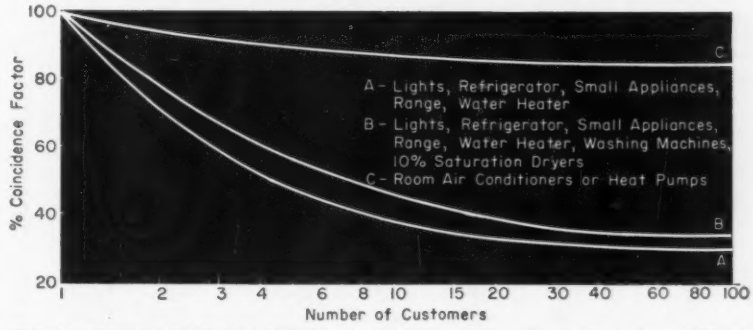

A - Lights, Refrigerator, Small Appliances, Range, Water Heater
B - Lights, Refrigerator, Small Appliances, Range, Water Heater, Washing Machines, 10% Saturation Dryers
C - Room Air Conditioners or Heat Pumps
% Coincidence Factor
100
80
60
40
20
1 2 3 4 6 8 10 15 20 30 40 60 80 100
Number of Customers

FIG 3—COINCIDENCE FACTOR for a particular type of customer is multiplied by the increased individual demand to give the new diversified demand curve

demand expected for one or more customers grouped at one point. These maximum kva demands may be used to determine the average maximum voltage drop through the transformer and secondary up to any point on the secondary bus. With acceptable limits for this voltage drop a basic design pattern may be set up for new construction.

For example, if 4-5% is acceptable for combined transformer and secondary drop, two 150-ft spans of three No. 2 ACSR secondary with a 15-kva transformer on the center pole can handle four customers per pole. This arrangement could also supply 12 Type 5 customers each with lights, refrigerator, miscellaneous appliances, range, and water heater. Table IV shows that four customers have a maximum demand of 9.15 kva, which represents about 1.9% drop on the secondary, and that 12 customers have a maximum demand of 19.54 kva, a transformer drop of about 2.7%. This is a 4.6% total drop.

To provide for growth, the ultimate voltage drop for the transformer and secondary should be about 150% of the allowable limits for new construction. The initial load on a transformer is another problem made evident by the 130% initial load suggested for the transformer in the above example.

ASA transformer loading guide (C57.92-1956) affords a basis for estimating the thermal capacity to handle a peak once each day following average loads less than transformer rating. Thus, in applying this information, characteristics of residential load demand are needed.

Demand curves from the three Type 5 customers with clothes dryers showed that one customer had a peak of 8.88 kw and a previous load of 4.00 kw; the second a peak of 7.20 kw and previous load of 3.60 kw; and, the third a peak of 6.30 kw and previous load of 3.30 kw. Other individual and group demand curves showed similar pre-peak loads of 50-60% of peak.

Applying rules from the ASA guide to this type of demand curve gives a safe loading of 160% of rating at an ambient temperature of 30C. This maximum was reduced a little to allow for higher temperatures and a safety factor. A proposed loading of distribution transformers is shown in Table V.

Conclusions from this study are:

1. For most customer types the old values for diversified demand are greater than present-day values.

2. Diversity between customer types is more pronounced than previously considered possible.

3. Transformer capacity installed for each new customer will be less, through application of demand data and transformer loading schedule.

4. Application of study results to distribution design for customers with high-wattage clothes dryers would provide adequate service.

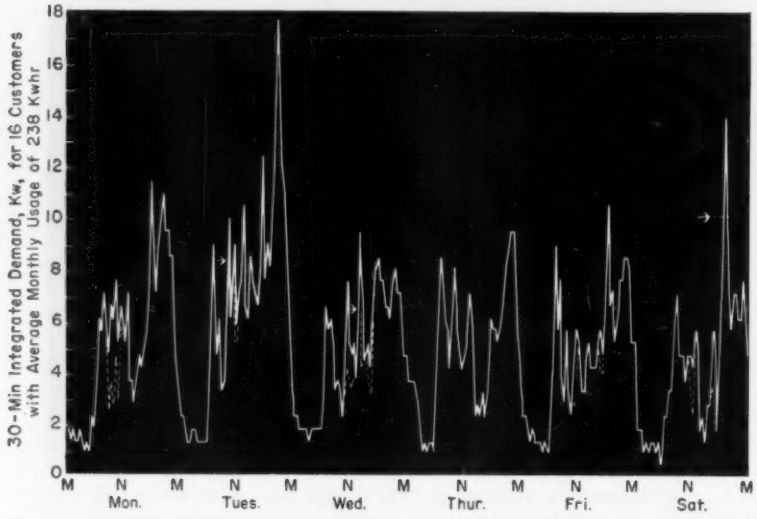


FIG 4—HIGH-WATTAGE CLOTHES-DRYER demand (dotted lines) is subtracted from demand of 16 customers, the small arrows indicating the reduced peaks

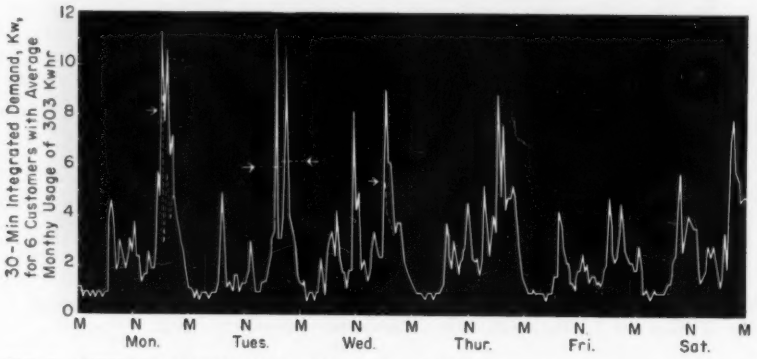


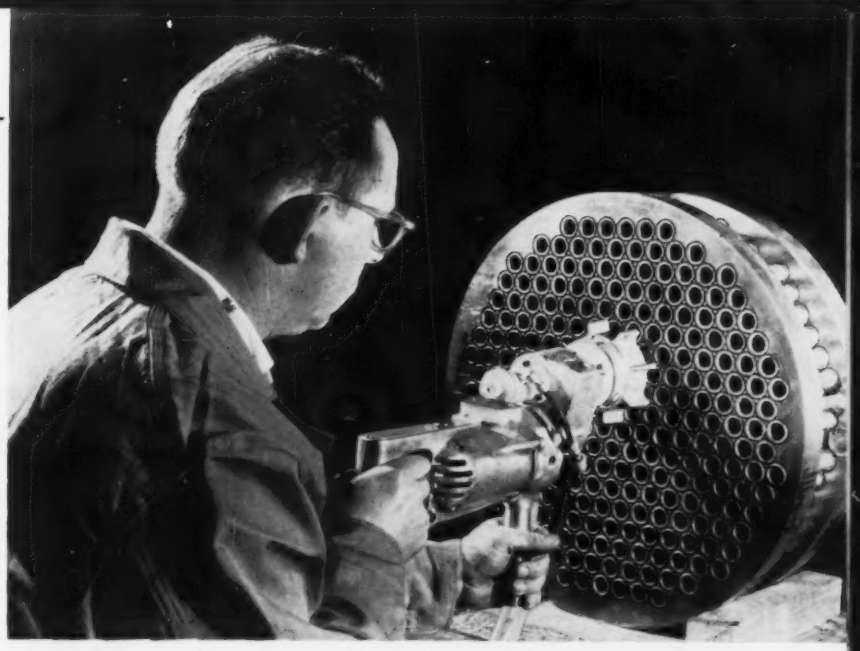
FIG 5—METERED MAXIMUM DEMAND of this high-wattage dryer was 5.5 kw, but it produced a six-customer peak only 2.6 kw larger than without the dryer

Table V—Proposed Loading of Distribution Transformers

	Initial Loading				Final Loading	
	Minimum		Maximum			% of
Kva Rating	Kva	%	Kva	%	Kva	Rating
3	0	0	3.5	116%	4.5	150%
5	4	80%	6	120%	7.5	150%
10	7	70%	12	120%	15.0	150%
15	13	87%	17	113%	23.0	153%
25	18	72%	29	116%	38.0	152%
37½	30	80%	42	112%	57.0	152%
50	43	86%	58	116%	75.0	150%

Condenser Tubes Are Welded

Has its nonferrous tubes joined to tube sheet by process and device developed by the manufacturer



AUTOMATIC GUN welds tubes into tube sheets for surface condensers. Besides expediting the welding, it permits welding on sheets in a vertical position

R. A. WILSON, Consulting Engineer, Heat Transfer & Water Conditioning Dept.,

W. W. EDENS, Supervisor, Melting Metallurgy, Research Laboratories, Allis-Chalmers Mfg Co, Milwaukee, Wisc.

A 90,000-sq-ft surface condenser, now under construction at a Midwestern utility plant, will have nonferrous condenser tubes welded to tube sheets by a process and automatic device developed by Allis-Chalmers Manufacturing Co.

The feasibility of the procedure and the most economical combination of weldable metals have been established in tests conducted by the company's research department. The apparatus for field welding condensers was developed in the course of the tests.

For welding, the tungsten inert gas method with dc was found to be best, especially when an overriding high-frequency ac initiates the arc and starts the weld. This process is applied to naval brass tube sheets and admiralty metal tubes. The tube welded to the tube sheet, according to test results, exhibits a joint strength about 50% greater than had been attained by other methods. Such high-grade welds assure dependability of joints.

The company initiated the tests to find a means of welding condenser tubes to tube sheets so as to eliminate contamination of condensate in the condensers of such modern high-pressure units as once-through boilers and nuclear power cycles. Although the modern condenser with expanded tubes produces a condensate with a purity value comparable to the purest water available, the tube and tube sheet joint remains a possible source of condensate contamination. Welding the joint, however, has to meet these other several requirements:

1. Welding must be carried out on tube sheets in a vertical position.

2. The tubes cannot be expanded into the tube sheets before welding if the welds are to be tested for tightness.

3. The welding process must develop a high percentage of sound welds, as the cost of testing and making repairs may be prohibitive.

4. Defective welds must be reparable.

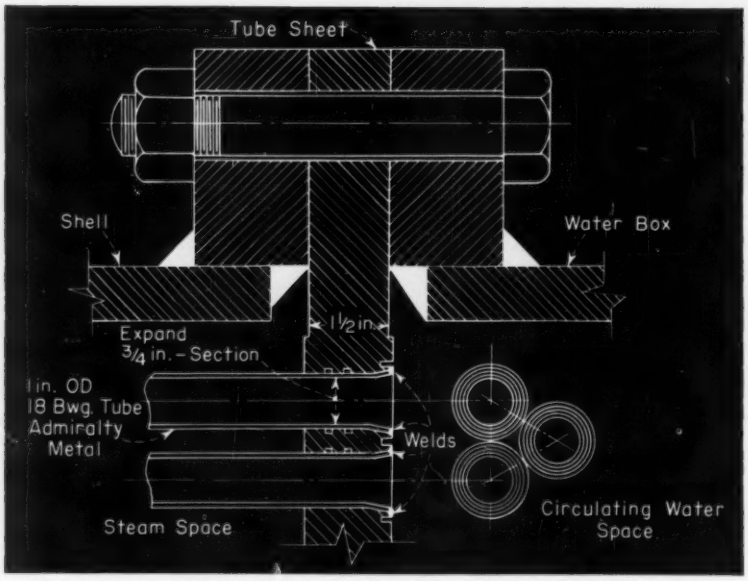
5. Removal and replacement of welded tubes in service must be practicable.

6. The welding process must be such that welders from the construction industry can be trained to do dependable jobs.

7. Tube and tube sheet alloys

Table I—Approximate Size Limitations and Physical Properties of Condenser Tube Plate Alloys

	Maximum Weight		Minimum Physicals			Relative Cost	
	Circles	Rectangles	Tensile Strength	Yield Strength 0.5% Load	% Elong. in 2"	Per Lb	Per Square Ft
Leaded Muntz	12,000	15,000	40,000	12,000	35	1.00	1.00
Naval Brass	12,000	15,000	50,000	18,000	35	1.04	1.04
Admiralty	3,000	3,800	45,000	15,000	35	1.11	1.13
Copper Nickel							
70–30 Alloy	6,000	8,000	45,000	18,000	35	1.60	1.70
90–10 Alloy	6,000	8,000	38,000	15,000	30	1.36	1.45
Aluminum Bronze							
Alloy E	6,000	8,000	80,000	30,000	10	1.37	1.24
Alloy D	6,000	8,000	65,000	28,000	35	1.36	1.24
Silicon Bronze							
3% Silicon	6,000	8,000	50,000	18,000	40	1.20	1.22



TUBES are welded to tube sheets after expansion with roller for mechanical support. Here is cross-section near juncture of tube sheet with condenser shell

should be those proved satisfactory for condenser service.

8. Tube sheet distortion and welding stresses should be reduced to a minimum. Alloys requiring a thermal stress relief for a dependable weld are not usable.

Many Materials Tested

The installation of condensers for varying conditions of circulating water calls for the use of a wide range of tube materials. The tests, accordingly, began with an effort to determine compatible weldable materials for each such situation. A large variety of sample tube and tube sheet materials were assorted into many combinations. The sheets were drilled, and the tubes were inserted and welded. Welding techniques varied for the various metal combinations, and results were carefully checked after each completed weld.

After welding hundreds of combinations, work was concentrated on those showing the most promising results. Tests indicated that the most economical combination, from a welding standpoint, was naval brass tube sheets and admiralty metal tubes welded with the tungsten inert gas method using dc. Other combinations acceptable in varying degrees were:

Naval brass tube sheets with arsenical copper tubes.

Naval brass tube sheets with aluminum brass tubes.

Naval brass tube sheets with 90/10 copper nickel tubes.

Naval brass tube sheets with 70/30 copper nickel tubes.

Silicon bronze tube sheets with admiralty tubes.

Naval Brass Favored

Machinability and size limitations favored naval brass over silicon bronze. Unacceptable welds resulted from the use of dc with aluminum brass tubes and naval brass tube sheets, but ac and overriding high frequency gave satisfactory welds.

Test blocks were fabricated so that pressure tests could check the welds. They were bars about 2 x 2 x 12 in. with holes drilled for six tubes. The holes were tapered at both ends. A groove was machined around each hole to provide a lip having a metal thickness about equal to that of the tube wall. Tubes were inserted, flared to fit the taper, and welded. A 90-lb air pressure was then applied through a tapped hole into space between the tube and the block, and the tightness of the weld was checked with soapy water. A relief space along the tube assured that the air pressure reached the welds.

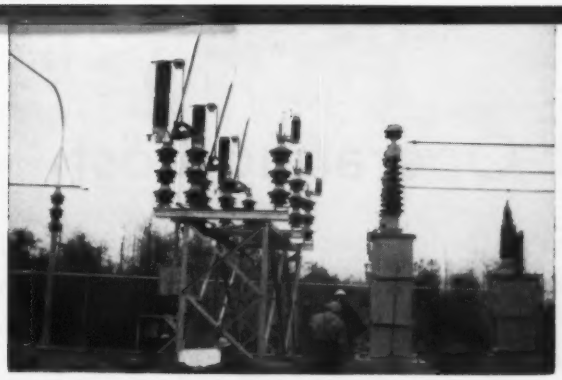
To simulate field conditions, larger samples were constructed consisting of rectangular tanks with tube sheets securely mounted on each end. One vessel was built up with tube sheets of naval brass and 105 admiralty metal tubes. Tubes were welded in a vertical position, and the vessel was then water tested. Only one leak was found.

Another tank of the same material had 108 tubes, or 216 welds, which revealed no leaks in the tests. A third tank of naval brass tube sheets with aluminum brass tubes was assembled and welded with the same percentage of tight welds.

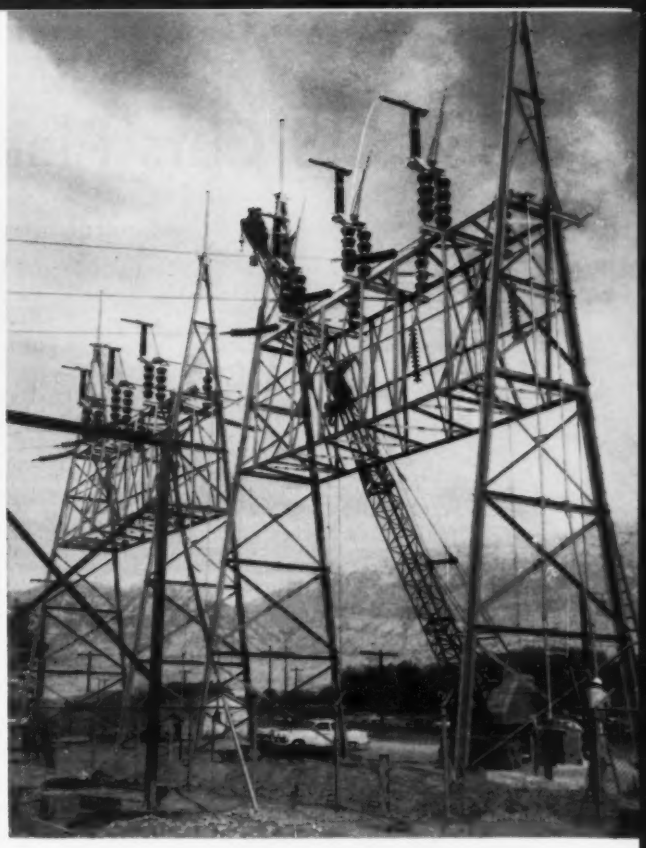
When the manual welding procedure proved satisfactory, the company turned its efforts to development of an automatic welding device. This apparatus is now being subjected to working tests. The tests point to its immediate available use for the field welding of condensers.

Table II—Approximate Relative Cost of Tube Materials

Alloy	Relative Cost per Lb	Density Pound per Cu In.	Relative Cost per Sq Ft
Admiralty Metal (Base)	1.00	.308	1.00
Arsenical Copper	1.09	.323	1.14
Aluminum Brass	1.14	.301	1.11
Copper Nickel			
90–10 Alloy	1.24	.323	1.30
80–20 Alloy	1.34	.323	1.40
70–30 Alloy	1.45	.323	1.52
Aluminum Bronze	1.32	.295	1.27



1. Back-to-back switching of 115-kv capacitor banks



2. Breaking load of steel mill served by a 138-kv line

Vacuum Switch Finds 2 Uses at High Voltage

The vacuum switch is making its appearance in the high-voltage field in two successful applications:

1. Back-to-back switching of 115-kv capacitor banks at a Bonneville Power Administration substation.

2. Breaking the load of a steel mill served by a 138-kv line on the Utah Power & Light Co system.

The switch, made by Jennings Radio Manufacturing Corp, uses tungsten electrodes with a $\frac{5}{32}$-in. separation under high vacuum in a glass-to-metal enclosure (EW, July 25, 1955, p 179).

The BPA installation consists of 12 Type-R9G vacuum switches, three per phase, incorporated into air disconnect switches for automatic switching of a 115-kv, 10,000-kva capacitor bank against a similar bank.

BPA required these acceptance tests: five operations at 2,500 amp and 85% of line-to-line voltage (97.7 kv) followed by satisfactory operation at 50-amp bank-to-bank capacitive switching, grounded-wye voltage of 66.3 kv. Acceptance at the manufacturer's laboratory, however, produced these results: two operations at fault currents in excess of 1,500 amp, five operations at 2,500-amp fault current at 99.8 kv, and satisfactory operation at 50-amp bank-to-bank switching at 69 kv.

In the Utah P&L installation vacuum switches are incorporated into motor-operated air-disconnect switches to provide maximum continuity of service to a steel mill during emergencies. The customer takes service from a 138-kv line which runs through his substation. This application requires the switches to open under load and to drop energized transmission lines.

The steel mill's own generating plant, which is operated in parallel with the utility's system, is normally off the line for scheduled maintenance about two weeks every second year and for shorter periods of minor maintenance. If an unscheduled outage of appreciable duration occurs on the transmission line or oil circuit breaker during these maintenance periods, the customer's process equipment would be adversely affected.

Therefore, this application requires 15 Type-R9G vacuum switches with shunt blades to carry 600 amp continuously, to interrupt this current at 138 kv, and to drop 40 mi of energized 138-kv line. Prior to being placed in service, each load-break switch successfully dropped 40 mi of line-charging current at 138 kv. According to manufacturer's tests, a 10,000-operation life can be expected at the 50-amp load-break level and 2,500-operation life at the 600-amp level.

Utah P&L provides the switches and steel structures while the steel mill furnishes the foundation for the structures and the control circuits for motor-operation. The customer's load dispatcher controls the switch operation on order from the utility.

Switch Also Used on 60/12-Kv Transformer

Besides these two high-voltage applications, the vacuum switch is being used successfully to break load current on a 60/12-kv 4,500-kva transformer at the manufacturer's plant. There, three Type-R8 switches per phase, rated 200-amp continuous and 50-amp load break, are mounted in a high-strength glass housing above the actuating mechanism. The entire unit rests on tank-mounted insulators.

This installation, requiring no additional space and a minimum of supporting structure, costs about the same as air disconnects. These vacuum switches can interrupt high load-break currents, therefore permitting fast switching times.

How CIS Cuts Plant Operating Cost

GENERATION
Operation

Central Information System computes, logs essential data, replacing 13 men at Gulf States Utilities' Neches Station

J. A. REICH, Production Manager;
W. B. GURNEY, Superintendent of Results,
Gulf States Utilities Co, Beaumont, Texas

A new "information center" with automatic logger, scanner, and alarms is reducing costs at Gulf States Utilities Co's Neches Station. This Central Information System (CIS) was designed to improve plant efficiencies and to cut operating expenses by reducing the number of operating personnel.

The CIS has released 13 trained men for other duties and has eliminated manual logging of measurements. As logged automatically temperature readings have a reproducibility of ¼%, and pressure measurements are consistently close to actual conditions. Kw output, Btu input, and Btu per net kw are well within expected limits. It is also anticipated that CIS will improve the plant operating efficiency.

Other advantages and company thinking concerning the CIS and its potential were reported in an earlier article (EW, Oct. 22, 1956, p 48). This article tells how the equipment components compute and log essential data for a new 111-Mw generator and six older units totaling 274 Mw.

CIS Adds; Replaces Nothing

All equipment for CIS supplements, parallels, or adds to present instrumentation or appurtenances. Nothing is replaced. In this way transformation from the old way of operation to the new is easier for operators. Omissions can be picked up without sacrificing operation because many spare points have been provided on the alarms, bearing scanner, and the log sheet.

The method of bringing net kwhr for each unit and for total plant into the Panalog 605-Scanner is shown in Fig 1. Thermoverters feed a voltage into a blind transmitter from which a linkage causes integration of kw for the hour, and a pneumatic signal gives instantaneous net kw. Total net kw is obtained by adding the thermoverter dc volts.

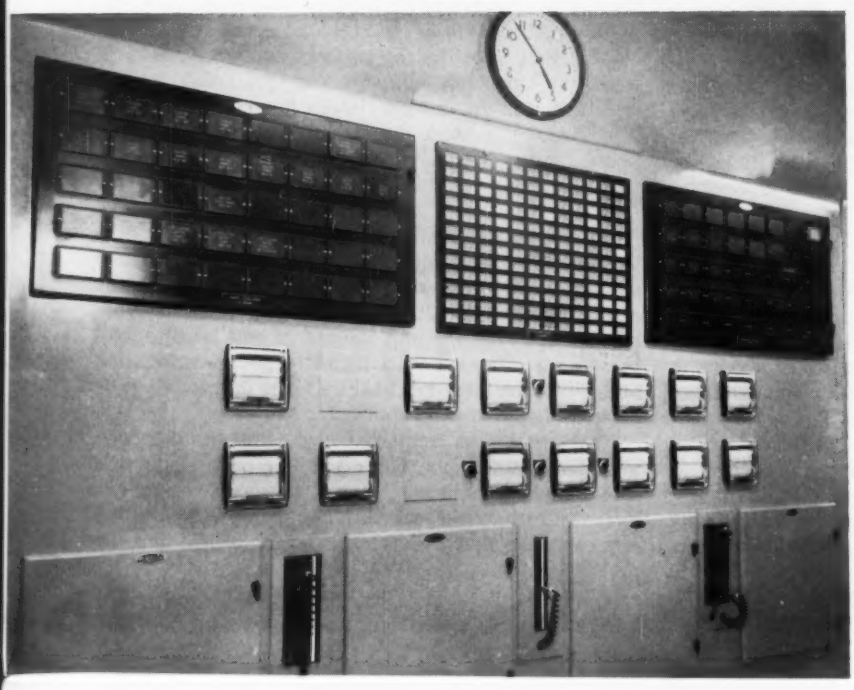
Fig 2 shows the method of bringing in the Btu for each boiler and the total plant. A pneumatic signal from the flow transmitter at the orifice is automatically compensated for pressure and temperature when totalized in the integrator. Then the signal is adjusted manually for Btu per cu ft and specific gravity. The resulting signal to the 605 is proportional to the total Btu to the boiler.

Pressure compensation is continuous, but temperature compensation depends on the temperature at the time of print out. Totalization for the hour and the 24-hr period is accomplished by sequential addition of each unit on memory units.

Trend recording of gas to the

* Adapted from a paper presented before American Society of Mechanical Engineers

Central Information System (CIS) Has Compact Panel



Upper left is a 40-point panel of retransmitted alarms from 21 panels in the plant. The 21 panels cover more than 180 functions such as level, temperature, pressure, trip-outs. Upper right is a panel covering 28 individual alarms that are either very important or not covered by the other panel. Upper center is the bearing temperature scanner panel covering 109 high-speed sleeve bearings. Scanning is done once every 15 min but may be made much faster.

Below the panels are 14 two-pen trend recorders having 30-day charts. Top row is for kw output and Btu gas input to each unit and total plant. The lower row records the quantity of gas from two supplies, as well as the feedwater flow and superheat temperature of each boiler. Two of the two-point recorders can be jacked into various functions using the patch panels below the recorders.

All alarms, trend recorders, and jacks operate independently of or in parallel with the logger and its typewriter.

boilers is uncorrected and nonlinearized. This recorded flow is proportional to the pneumatic signal from the flow transmitter which, in turn, is roughly proportional to the square of the flow.

Fig 3 shows the arrangement of thermocouples for reporting condenser cleanliness and preheater plate temperature. This simple hookup is important because the station experiences considerable trouble with condenser fouling, the major factor affecting plant efficiency and operation.

Iron-constantan couples are used for all temperatures in the plant, the highest being 900F. Pressures are transmitted by transducers. Levels, conductivity, and pH are retransmitted from slide wires.

Fig 4 shows the block diagram of the computer signal sent to the Panalog 605. The Btu and Mwhr signals from field-mounted transmitters are fed continuously to and accumulated by the 1-hr integrators.

When the automatic hourly log occurs, each integrated Btu and Mwhr value accumulated during the last hour is read out by the 605. Simultaneously these signals are sent to 24-hr accumulators and stored. During the hourly log, the total hourly flow is also accumulated during storage in a 24-hr pot and then read out on the 605 at the end of the log. After the hourly log, all hourly integrators are reset to zero.

From these hourly data the computer calculates and reads out efficiencies of Btu per kwhr for each generating unit.

After the 24th hour's log, the signal input to the 605 is switched to the 24-hr accumulators and into the totals section of the log sheet. Stored Btu and Mwhr signals are read out from the accumulators, as is the total plant Btu flow. Then all 24-hr accumulators are reset to zero.

Estimates of hourly values can be obtained by depressing a demand button before an automatic hourly log occurs. By means of a time compensation unit, values accumulated in each hourly integrator are projected to values that would be accumulated had the existing signals remained constant for 1 hr.

Fig 5 is a block diagram of the 605's logging and scanning systems. In the log position, print-out is at the rate of 72 points in 90 sec, or a

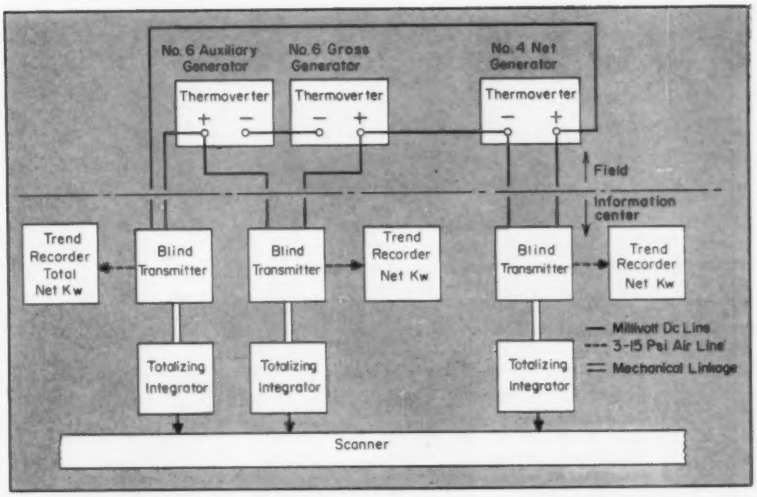


FIG 1—NET KWHR OUTPUT of each turbine and total plant net kwhr are brought into the scanner via thermoverters, blind transmitters, and integrators

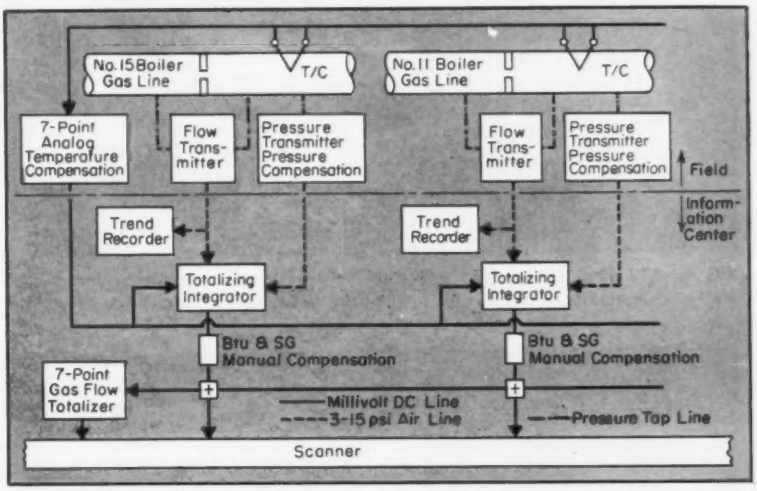


FIG 2—BTU INPUT to each boiler and total Btu input are fed to the scanner after compensation for temperature, pressure, Btu per cu ft, specific gravity

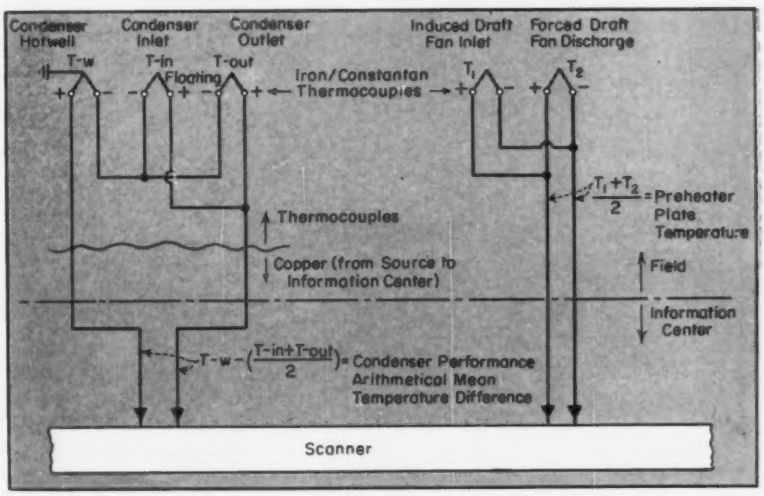


FIG 3—IRON/CONSTANTAN THERMOCOUPLES are used to perform the important function of reporting condenser performance and preheater plate temperature

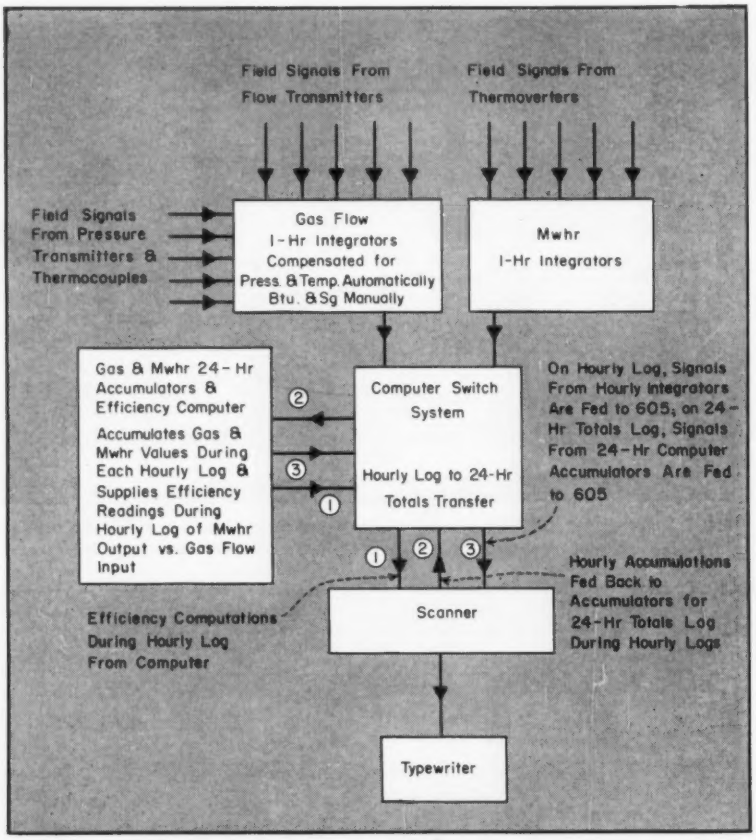

Field Signals From Flow Transmitters
Field Signals From Thermoverters
Field Signals From Pressure Transmitters & Thermocouples
Gas Flow 1-Hr Integrators Compensated for Press. & Temp. Automatically Btu. & Sg Manually
Mwhr 1-Hr Integrators
Gas & Mwhr 24-Hr Accumulators & Efficiency Computer
Accumulates Gas & Mwhr Values During Each Hourly Log & Supplies Efficiency Readings During Hourly Log of Mwhr Output vs. Gas Flow Input
Computer Switch System
Hourly Log to 24-Hr Totals Transfer
On Hourly Log, Signals From Hourly Integrators Are Fed to 605; on 24-Hr Totals Log, Signals From 24-Hr Computer Accumulators Are Fed to 605
Hourly Accumulations Fed Back to Accumulators for 24-Hr Totals Log During Hourly Logs
Efficiency Computations During Hourly Log From Computer
Scanner
Typewriter

FIG 4—BTU AND MWHR SIGNALS from field-mounted transmitters are continuously accumulated by the one-hr integrators and read out hourly by the scanner

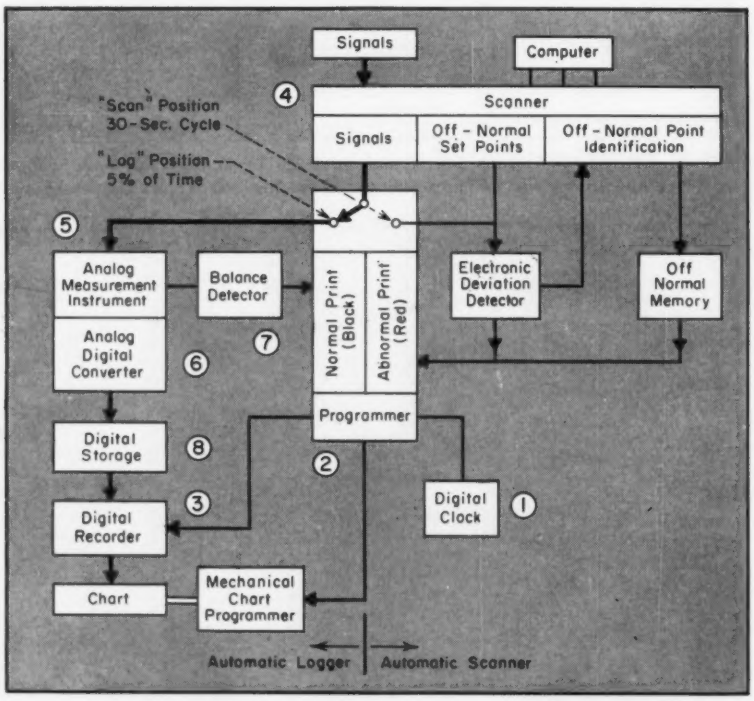


FIG 5—AUTOMATIC LOGGING SYSTEM has four-phase operating sequence: input selection, null balance in potentiometer, storage of input, typewriting data

total print-out time of 3 min. In the other position, scanning is continuous at the rate of 5 points per sec, or a complete scanning in 30 sec. Analog measurements are 0.2% accurate and digitizing is ±1 digit in 1,000.

4-Phase Operating Sequence

The operating sequence of the automatic logger consists of four phases: Input selection; null balance in the potentiometer; storage of input; and, print of the typewriter. This sequence is shown roughly by the numbers in Fig 5:

- Clock (1) in programmer starts operation.
- Programmer (2) scans clock output and feeds it in proper sequence to the typewriter (3) for printing.
- Scanner (4) connects the first input to the analog measuring system, and a programming level in the scanner selects the correct range of input signal.
- Programmer (2) now permits balancing to take place.
- Balance detector (7) signals when null or balance is reached.
- Programmer scans the analog digital converter (6) output and records it in digital storage (8).
- When storage is complete, the scanner steps to the next point; and printing of the stored information begins.

Prevents Bearing Failure

The programmer scans storage and feeds the information to the typewriter (3) for printing. While this point is printed, the next is being balanced and stored. The programmer does all mechanical positioning of the chart. The analog-digital converter (6) coupled to the measurement system (5) translates shaft position (analog value of input voltage) to a digitizer.

Operation of the CIS already has prevented a bearing failure. A "read-out" and alarm indicated a hot fan bearing in a remote section of the plant. The roving operator was alerted, inspected the bearing, and reported the CIS was in error. The warning functions, however, kept repeating. At the second inspection an oil line was found broken. Sufficient lubrication was evidently retained to prevent a bearing failure before the trouble was found and corrected.

Here's an easy way to help PREVENT coming air-conditioning load problems

It won't be long. . . . hot weather is coming . . . and so are the load problems resulting from the growing number of air conditioners being added to your lines.

But, with the General Electric CF-7 hook-on recorder these load problems can be anticipated . . . can be prepared for before the problems actually occur.

THE CF-7 PORTABLE, hook-on recorder offers you a convenient, economical means of obtaining the accurate records you need for intelligent load planning . . . and for the most efficient use of substation equipment. It provides these valuable records with an accuracy of 3% full scale . . . with a wide choice of ranges . . . and for all varying loads up to 750 amperes.

Check these important features:

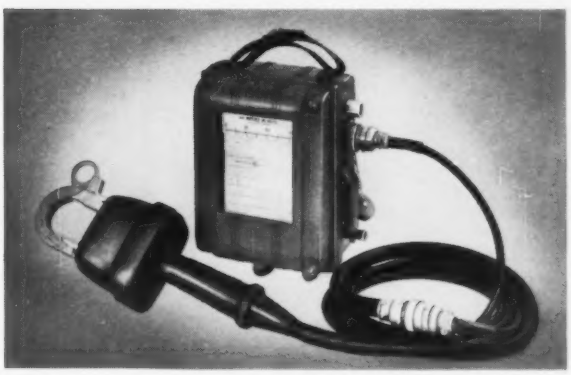
1. HIGH ACCURACY—3% accuracy of full scale gives you records you can rely on for future planning.

2. FAST, EASY INSTALLATION—simply hang recorder, connect to 120v or 240v power supply, select current range, attach leads, and hook on the line.

3. NO SERVICE INTERRUPTION—no cutting or splicing required when measuring current . . . CF-7 will operate continuously for 30 days without attendance.

4. 8.7 KV TRANSFORMER INSULATION RATING—made possible by stronger Butyl molded insulation . . . enables safe, accurate testing of even high-voltage circuits.

5. MULTI-RANGE OPERATION—close readings can be made over ranges of 15/30/75/150/300/750 amps and 150/300/750 volts a/c.



Why not look into the CF-7 now . . . before the load problems of air conditioning are here. Let your G-E representative point out the ways you can benefit from this versatile instrument. If you wish more printed information, write to General Electric Company, Section 582-24, Schenectady 5, N. Y. for a free copy of Bulletin GEA-6104.

GENERAL ELECTRIC

NEWEST REASON WHY ALL TRANSFORMERS ARE NOT ALIKE

Molded Covers: now on trial

Unique development represents General Electric's first step toward a molded distribution transformer cover with molded-in bushings to reduce costly service trips.

The improved molding material for General Electric's experimental distribution-transformer covers and bushings is designed to prevent creep tracking—a common occurrence when conventional organic insulating materials are used in contaminated atmospheres. In the photo above Distribution Transformer Department's M. Broverman, Mgr. Design Engineering (left), and W. A. McMorris, Mgr. Advanced Product Engineering, study a completed assembly. The molded parts will be given extensive tests on utility systems this year.

The new molding material is an outgrowth of General Electric's development of molding materials resistant to arc tracking, first introduced by G.E. in the late nineteen-forties for molded instrument transformers.

Present design is only first step

The new molded bushings and covers, representing the first step in this development, utilize newly developed materials to replace steel covers and porcelain bushings. Plans for more advanced molded covers and bushings, however, are already on the drawing board and models are already in Pittsfield testing laboratories.

Next: one-piece designs

Present plans call for eventually molding the high-voltage bushing and the cover in one operation to give one-piece construction. This will reduce the number of openings into the tank.

Cost a major factor

Wide manufacture of General Electric's new molded covers and bushings must wait a few years until resin prices—now on the downswing—reach competitive levels. Then utilities can expect several benefits from G.E.'s new development.

Utilities will benefit

Units with molded covers will need fewer repaintings, since the cover, now the part most subject to weathering, will remain factory fresh. Bushings will last longer—molded materials resist damage better than porcelain. Finally, squirrels and birds will not short out units because the cover itself is an insulator.

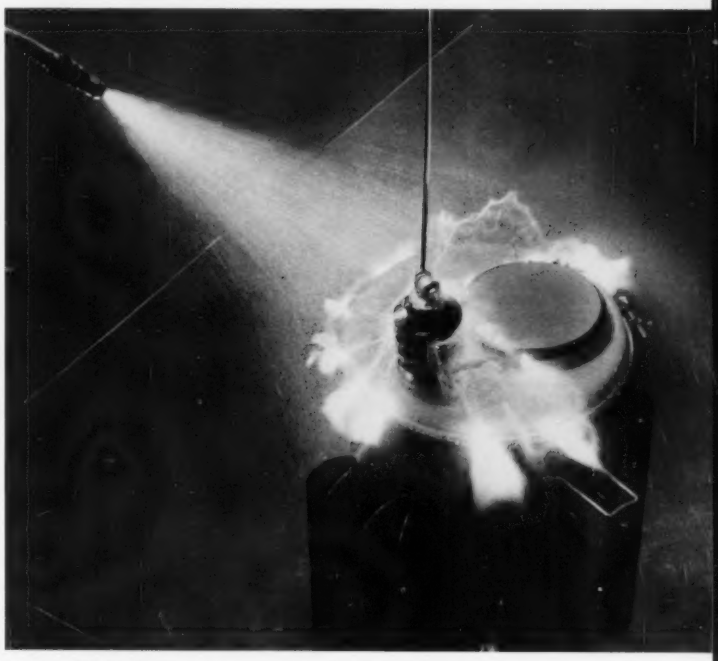
All Transformers Are Not Alike

Continuous engineering development is only one advantage of General Electric distribution transformers. Others include *engineered packaging*, coast-to-coast *warehouse facilities* for fast delivery, *Formex** wire for reductions in tank size, self-protected transformers with new, improved *circuit breakers*, and many others—evidence that all transformers are *not* alike.

For complete information, contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to Section 431-53 General Electric Company, Schenectady 5, New York.

*Reg. Trademark of General Electric Co.

NO MORE TROUBLE WITH SQUIRRELS. New cover is made of non-tracking high-resistance compounds to prevent squirrels and birds from causing line outages, thereby reducing costly service trips.



DIELECTRIC TEST. Simulating an electrical discharge during a heavy rainstorm, test subjects molded bushing and cover to wet flashovers of 50,000 volts at 60 cycles. Despite repeated flashovers, there is no tracking and no damage to the molded materials.

Progress Is Our Most Important Product

GENERAL ELECTRIC

SUBSTATION—Design

New Substation Design Saves $46,000

H. F. JENKINS, Principal Engineer,
Kansas City Power & Light Co,
Kansas City, Mo.

Changes in design practices saved Kansas City Power & Light Co $46,000 at one substation without sacrificing much switching flexibility.

The design changes were preceded by a careful study of major substations on the 161-kv system to determine what savings were obtainable through eliminating equipment considered desirable yet not actually essential.

Relaying Altered

Changes have been made in the relaying of a line section and transformer, or transformers, together with provisions for disconnecting the faulted line section or transformers and re-energizing. Connections for the new scheme are shown in Fig 1. It replaces the arrangement formerly used at some substations, shown in Fig 2. One oil circuit breaker and two lightning arrester disconnect switches have been eliminated, and two oil circuit breaker disconnects have been replaced by horn-gap switches, as indicated.

Hot-Line Clamps Used

Lightning arrester disconnects were formerly used wherever coupling capacitor potential devices were called for to allow disconnection for maintenance and adjustment. In the new scheme coupling capacitors are connected with hot-line clamps, as experience has shown that disconnections are infrequent. Where the line can be taken out of service briefly, coupling capacitors are connected solidly to the line itself.

Some additional risk is accepted with the horn-gap disconnects in the main bus, the coupling capacitors, and the line deadend strain insulators. But with shield wire completely over the lines and substation providing a 30-deg protective angle and the use of modern lightning arresters, having lower sparkover and IR drop voltages, the risk should not be too great.

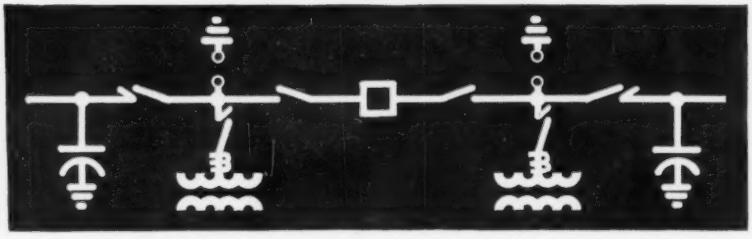


FIG 1—NEW SUBSTATION SCHEME was developed to eliminate unnecessary equipment while retaining considerable flexibility in the switching of the circuits

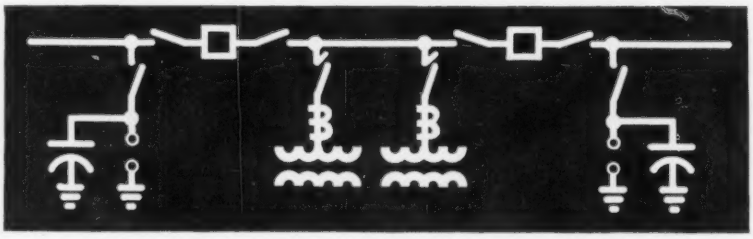


FIG 2—OLD DESIGN called for more oil circuit breakers and lightning arrester disconnect switches. One OCB and two switches are eliminated in plan above

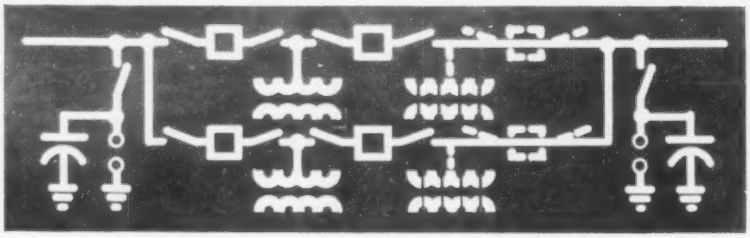


FIG 3—RING BUS DESIGN was applied to the original 161-kv substations. Newer configuration has two lines from each end of substation, ties between buses

CTs Are Necessary

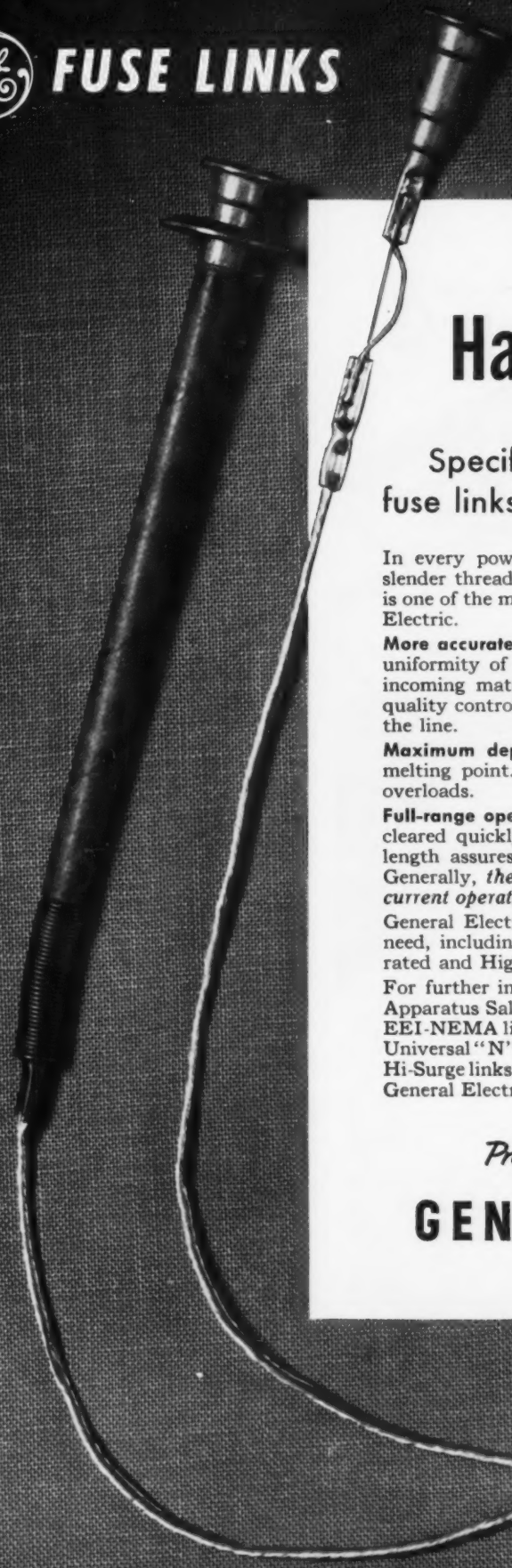
Original stations were built with a ring bus, as in Fig 3. This design has certain operating and protection advantages, particularly when the substation is supplied by a radial line with generation from only one direction.

But, as the configuration of the station may change so as to have two lines from each end of the station, the ties between buses can be removed. Then the station becomes double that shown in Fig 1, although with a somewhat different arrangement and more equipment.

In the scheme of Fig 1 transformer primary bushings must be equipped with current transformers to detect transformer differential. This provision increases the relaying and protection problems.

(More How To on page 68)

FUSE LINKS



Service continuity . . .

Hangs by a thread

Specify dependable General Electric fuse links for accurate system co-ordination

In every power distribution system, service continuity hangs on a slender thread of wire . . . a fuse link. That's why this low-cost item is one of the most highly engineered products manufactured by General Electric.

More accurate system co-ordination is possible because of the greater uniformity of G-E fuse links. Extensive design tests, careful tests of incoming material, close supervision in manufacturing, and periodic quality control checks assure you of reliable, uniform performance on the line.

Maximum dependability results from a fusible element with a low melting point. This protects the fuse holders from charring during overloads.

Full-range operation from high to low currents *allows* all faults to be cleared quickly and positively. An auxiliary fuse tube of the proper length assures successful operation in the critical low-current range. Generally, *the majority of cutout failures are caused by faulty, low-current operation.*

General Electric fuse links are available in ratings for every system need, including EEI-NEMA Standard "K" and "T," Universal "N" rated and High Surge.

For further information, contact your nearest G-E Apparatus Sales Office, or write for bulletins:

EEI-NEMA links GEA-6264
Universal "N" links GEA-1994
Hi-Surge links GEC-862
General Electric Co., Schenectady 5, New York

LIVE BETTER ELECTRICALLY

432-25

Progress Is Our Most Important Product

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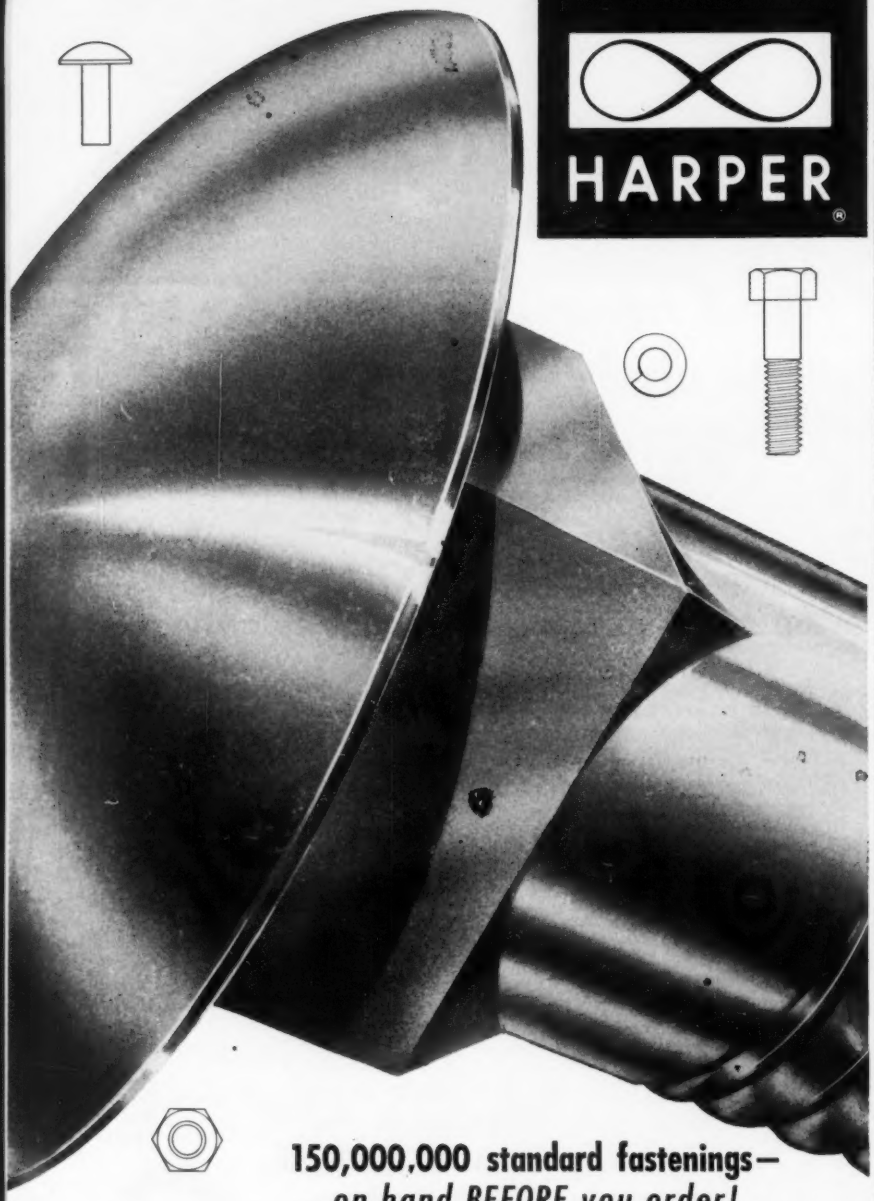

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...on hand BEFORE you order!

NUTS, for instance—hex, square, cap, castellated, heavy, finished, regular, wing, and knurled, in brass, bronze, stainless, aluminum, copper, nickel, monel. The exact fastening you need, on hand BEFORE you order. Your nearby Harper Distributor is a fastening specialist. He knows your problems. He'll give you quick service. Why shop? Why wait? Make just one telephone call to your Harper Distributor, and get immediate delivery.

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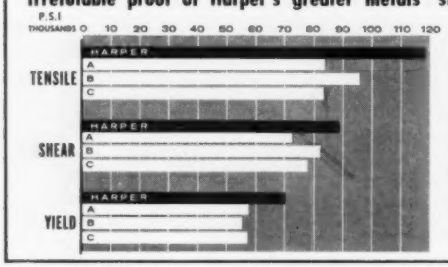
Irrefutable proof of Harper's greater metals' strength shown by laboratory test!



An important point in buying fastenings is strength. Independent laboratory tests*, utilizing Stainless Steel Machine Bolts by Harper and three other leading producers, prove Harper superiority in Tensile, Shear, and Yield Strength. The chart at left shows the actual results of these tests. For complete information on these important tests, request Form No. 126.

*By R. W. Hunt Laboratories

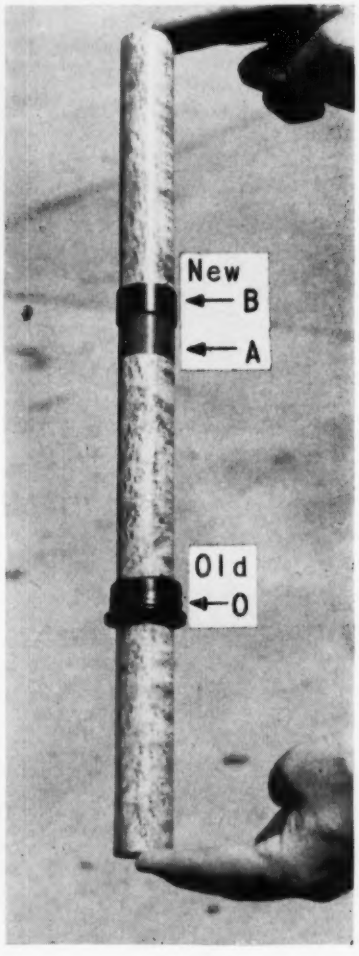
Guard Improved On Hot-Line Sticks

F. E. WISE, Substation Maintenance Man A, Appalachian Electric Power Co, Charleston, W. Va.

A guard or marker on each hot stick is a mandatory safety precaution in the American G&E system for preventing users from inadvertently getting too close to the live end of the stick. This guard must be felt easily by gloved hands of the user.

Has Added Precaution

An additional precaution for work after dark is a 1-in. band of luminous adhesive tape wrapped around the stick adjacent to the tangible guard.



When first adopted, the guard was made of L-shaped rubber, spliced with a scarf joint and held in place with adhesive. A band of plastic adhesive electrical tape over the rubber guard kept the scarf joint from separating. But much difficulty was encountered in trying to keep the guard in place. Often the guard increased the diameter of the stick so that it would not fit in the containers for carrying and storing it.

Guard Improved

Building it up entirely of plastic adhesive tape provides a much more satisfactory guard. To do this, a band (A) of 1-in. luminous tape is wrapped around the stick (at the position recommended by the AGE Safety Manual), with the ends overlapped ¼ to ½ in., and is followed by an adjacent band (B) of ¾-in. plastic adhesive electrical tape built up to about ⅛-in. thickness or approximately 15 layers. The tape's adhesive does not allow the marker to shift.

Savings Worthwhile

Savings on material alone amount $6.25 per 100 bands for the 1½-in. sticks, compared with the previous method. But the primary advantage of this marker is its physical and visual warning against holding the stick within the recommended safe distance from its hot end.

GENERATION—Construction

Maintain Stack Strength During Construction

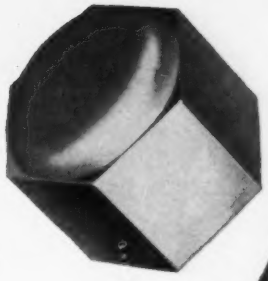
Stack construction at the River Rouge plant of the Detroit Edison Co was carried out in a step-by-step process to maintain maximum strength against high wind velocities during construction.

The steel stacks are brick lined. In erection, the lining work followed closely the steel ring erection, never being more than 70 ft behind the top of the steel.

Steel workers and brick layers alternated on two stacks. Or, the steel would go up in daytime and the lining at night, whichever schedule fitted the work to be done.

HARPER®

CORROSION-RESISTANT FASTENINGS



Harper FLO-FORM Process
Saved money...made part better!

A manufacturer of an electrical hand tool was milling and slotting a copper conductivity pin from wire. The cost was too high—too many rejects. They called in the Harper Application Engineer who suggested redesign of the part for production by the Flo-Form Process. Now it is made at lower cost. There are no rejects. Grain structure is better. The part is stronger and more efficient. Your "special" problem can be solved by the Harper Flo-Form engineering team of designers, metallurgists, and tooling specialists with vast experience gained in over 33 years of solving fastenings problems. Save money. Send us your problem today or call your nearby Harper Branch for Harper Application Engineering Service.

Meet GORDON GOODWIN, Harper Application Engineer

If you're in the Cleveland area, you have perhaps discussed special fastening problems with Mr. Goodwin. Gordon is another member of the Flo-Form Team which offers Harper Application Engineering Service. His wealth of experience and knowledge of fastenings is invaluable to Harper users.

THE H. M. HARPER COMPANY
8205 LEHIGH AVENUE • MORTON GROVE, ILLINOIS

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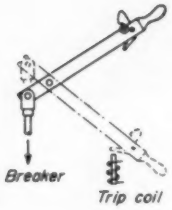


Fig 1—Manual

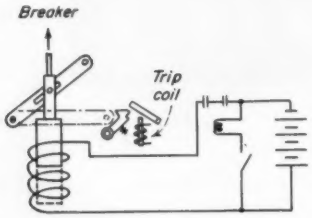


Fig 2—Solenoid

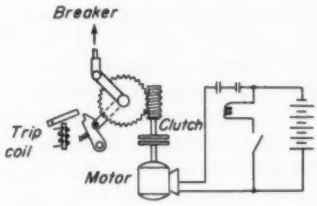


Fig 3—Motor

Six Basic Types of Operating Mechanisms

W. T. PARKER, Circuit Breaker Engineer, Westinghouse Electric Corp, East Pittsburgh, Pa.

Circuit breaker operating mechanisms differ principally in the means of deriving energy to perform required functions. Main types of mechanisms are enumerated below. Each has some distinct advantage, such as economy, simplicity, speed, or power requirements. The tripping function is almost universally powered by an electromagnet.

1. Manual Type. Original cost, simplicity, and ease of maintenance give the hand-operated mechanism, Fig. 1, a distinct advantage over all others. It's limitations are: (a) Interrupting duty should not exceed 250,000 kva; (b) An operator should always be present to supply reclosing power; and (c) Short periods of power outage must be permissible. This type is used mainly for institutional and industrial distribution and for motor starting.

2. Solenoid Type. For breakers of larger sizes and increased interrupting capacity an electromagnet, powered from a storage battery, is generally selected for closing. While solenoid mechanisms, Fig 2, are relatively simple kinematically, their cost is boosted by auxiliary switches, relays, storage batteries, and heavy cable. But these mechanisms provide reliable and trouble-free operation and require a minimum of maintenance. Several breakers can be operated safely from one, average-size battery to keep battery cost per mechanism low.

An inherent limitation of a solenoid is: Its pull falls off rapidly at the time maximum pull is needed to check opening motion and reclose the breaker.

Shorter interrupting time is obtained with high-speed latches and mechanically trip-free linkages. But the latter conflicts with faster reclosing because a trip-free linkage has to reset and latch before the closing coil can be energized. This handicap is overcome by making the mechanism non-trip-free for the first opening. With breaker and solenoid linked together, the closing coil can be energized early in the opening stroke. The moment current starts in the closing coil, its magnetic field operates a linkage to select another set of latches and make the mechanism mechanically trip-free for fast subsequent tripping. This arrangement cuts reclosing time from 50 to 35 cycles while maintaining high-speed opening immediately after a closure.

Shorter reclosing times are not practical with solenoids because: (a) Inductance limits the rate at which pull can be developed by limiting rate-of-rise of closing-coil current; and (b) Pull decreases exponentially as moving and stationary-pole pieces separate. Supplying more energy to the mechanism is not the solution because the practical limit on current has already been reached.

3. Motor Type. Where large capacity storage batteries are available and breaker reclosing time is faster than 35 cyc, a dc series motor mechanism, Fig 3, can be used to circumvent the inherent limitation of the solenoid. Speed-torque characteristics of the dc motor are particularly suited to this application because torque increases as speed decreases. However, starting currents (locked rotor) approximate those associated with solenoids of comparable load capacity. And the clutching arrangement, which provides the mechanically trip-free feature, introduces manufacturing problems and is delicate to adjust.

4. Pneumatic Type. Where large breakers must be reclosed in less than 20 cycles, a desirable operating medium is compressed air. It is universally available, inexpensive, and can be stored under pressure. The air can be discarded after use, thus obviating necessity of maintaining a leakproof, closed system for the energy medium. A 110/220-v single-phase motor-driven air compressor charges the reservoir. Charging can be at a relatively slow rate because breakers generally operate infrequently.

Pneumatically operated breakers, Fig 4, are particularly suited to isolated or unattended substations. A separate air compressor and storage reservoir makes each breaker an independent unit. Even though power for the compressor motor may be lost temporarily, the reservoir has sufficient capacity to operate the breaker many times. For prolonged outages a portable reservoir can be used to further extend operation.

Locating the reservoir adjacent to the mechanism keeps air transmission losses low and permits rapid response to controls. Elasticity of air reduces shocks inherent in rapid changes in direction encountered in high-speed reclosing. This characteristic contributes materially to breaker life and lengthens periods between maintenance overhauls.

Most circuit breakers have relatively light force requirements during the early part of the closing stroke. Relatively heavy force is required during the latter part of the stroke to close interruptors and to store energy for the next opening.

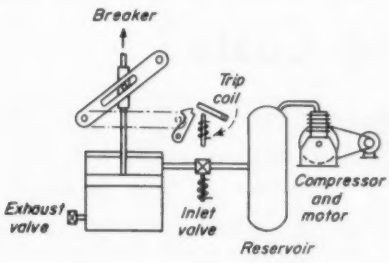


Fig 4—Pneumatic

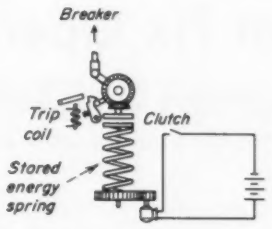


Fig 5—Spring

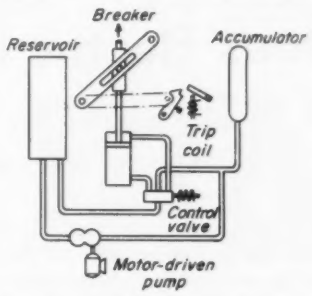


Fig 6—Hydropneumatic

for Closing and Opening Oil Circuit Breakers

Pneumatic mechanisms are capable of much more force than a solenoid at the start of a closing stroke. This permits increased initial acceleration to cut closing and reclosing time. This force, if sustained, could cause excessive contact speed before the heavier loads near the end of the stroke are picked up. But pneumatic mechanisms can control force by throttling the air on its way to the closing cylinder to limit contact speed while retaining full closing potential near the end of the stroke to compensate for the greater load. A solenoid has no comparable means of adjusting its force to changing load requirements.

Pneumatic mechanisms lend themselves readily to selective tripping. This permits rapid and smooth reclosing and still maintains the extremely fast opening of mechanically trip-free mechanisms. Selectivity is made responsive to presence or absence of air pressure in closing cylinder.

5. Spring Type. The spring-operated mechanism probably could be classified between the solenoid and pneumatic mechanisms in cost and simplicity. It should compare favorably with the solenoid type for low maintenance. Its disadvantage—generally only enough energy is stored for one closing operation. But power requirement is lower than for the solenoid because the motor which restores the energy operates over a comparatively longer time than the closing time of the breaker. Lower power requirement cuts installation costs by eliminating heavy cables required for solenoids.

The spring mechanism can be recharged manually in event of a power failure. But it requires the immediate and continuous attention of an operator because only one operation can be stored at one time.

6. Hydropneumatic Type. The hydropneumatic mechanism, as name implies, is a combination of hydraulic and pneumatic principles in one device. Hydraulic fluid transmits to the operating mechanism energy that has been stored by compressing a gas in a storage chamber. As generally applied, air is compressed to several thousand psi in the hydropneumatic mechanism as against a few hundred psi in the pneumatic mechanism.

By using a system continually full of incompressible fluid, the hydropneumatic mechanism responds more rapidly to control signals. But inertia and friction losses tend to discount the initial gain so that its over-all performance is comparable with the pneumatic system.

Components of hydropneumatic system and corresponding components of pneumatic system (in parenthesis) are: Accumulator with liquid gas separator (reservoir); hydraulic pump and motor including air filter on pump, oil filter and moisture separator (compressor and motor including air filter); pressure switches for low pressure alarm, low pressure cutoff and governor; pressure switches for low pressure alarm, low pressure cutoff and governor; (pressure switches for low pressure alarm, low pressure cutoff and governor); pressure gauge on accumulator (pressure gauge on reservoir); pressure relief valve (safety valve); control valves include single-pilot valve and coil also inlet, limit, latch, pilot flow, low pressure, exhaust, pressure regulator and separator shut-off valves (control valves include single pilot valve and coil, also inlet and exhaust valves). Hydropneumatic system requires a sump.

Small leaks in the pneumatic system are of little consequence. In fact, they serve to cause the compressor to operate occasionally insuring freedom of valves and lubrication of bearings. Leaks in a closed fluid system can be more serious. One method used to overcome this is to immerse practically the whole system in a tank which serves as a fluid reservoir. Thus fluid which leaks past valves, fittings, joints, etc., returns to the reservoir and is salvaged. Another method is to use conventional open piping which permits ready inspection and add dye to the fluid to permit ready detection of leaks.

The hydropneumatic mechanism offers two advantages not commonly available in most pneumatic mechanisms. These are: (1) An emergency manual means for recharging the accumulator; and (2) Positioning valves which permit utilizing the stored energy for slowly opening and closing the breaker to check its adjustments.

Summary. Hand operated mechanisms surpass all others for low cost, simplicity and ease of maintenance. But they are limited in application to small breakers with an operator in attendance.

Solenoid mechanisms are used with larger breakers. Their inherent simplicity requires a minimum of maintenance attention. But they require large battery and cable capacity, and sacrifice rapid reclosing capabilities.

Pneumatic mechanisms are the usual choice for the more exacting requirements of today's large breaker applications. Hydropneumatic mechanisms also meet these requirements but require high pressure and a closed system.

Spring mechanisms overcome high current demand of solenoid but sacrifice immediate repetitive operations.

Does Electric Heat Fix Operating Costs?

Yes, says Cowlitz County PUD's commercial manager. Once customer has electric heat, appliance load means little, except in non-heating season

Electric heat is the determining factor for residential customer's operating cost rather than the number of appliances he has in his home, except during non-heating months, according to Lacy Peoples, commercial manager of Cowlitz Public Utility District in Washington.

In a 13-yr electric heating analysis (1943-1955) involving thirty-six homes, Cowlitz County PUD has come up with some interesting thoughts for load and revenue forecasters and distribution system engineers in areas having various degrees of electric heating saturation.

Each home was equipped with an electric range, water heater and thermostatically-controlled individual room heaters. Kwhr consumption for the nine years from 1943 to 1951 averaged 20,937. Over the thirteen years, it averaged 21,513 kwhr. This means an increase in the average of only 2.75% during the last four years.

Meanwile, Cowlitz County PUD figures indicate that its over-all residential kwhr consumption jumped from 2,284 in 1943 to 5,475 in 1951 to 10,840 in 1955. To some extent, the gain in the over-all average can be credited to an increased number of heating installations. But, says Peoples, the relatively large gain in over-all residential average compared to that of the heating customers for the last four years seems to indicate that, as far as kwhr consumption is concerned, once your customer has installed electric heating the consumption is controlled by the outside temperature rather than the number of appliances installed.

In other words, Peoples continues, the operating cost of the electric heating customer is fixed, and any future addition to electrical equipment to further his "better electrical living" will not increase his operating cost, except during the non-heating season.

'57 A.C. Growth to Lead Economy: GE

Central residential air conditioning during 1957 will continue to lead the nation's economy in growth, according to H. N. McMenimen, Jr., sales manager of General Electric's air conditioning division. Speaking to a group of New York area GE air conditioning dealers, McMenimen also stated the industry will sell one-third more home cooling units than it did in '56. He figures the New York-New Jersey metropolitan area will lead the rest of the country with an increase of about 50%.

Altogether manufacturers will move close to 230,000 units. This, despite the sharp decrease in new home starts . . .

Why?

Well, for one thing, according to McManimen, the big drop in home starts has been among the lower-priced homes, and central A.C. units have been going into the more expensive ones. Starts among these have actually shown an increase over '56.

Another reason: Builders are installing air conditioning in their homes and using it as a selling point . . . and it works!

The GE spokesman further backs up his optimism by pointing to the still untapped $8 billion annual market in home improvement field. He thinks this segment of the market will account for more than half the units projected for 1957.

GE is optimistic enough about this market to have built a $15 million plant in Tyler, Texas in order to turn out easily installed home cooling units specifically designed for modernizing older homes.

Then there are the recent favorable government decisions regarding FHA and VA regulations. These will contribute to the better business climate in which A.C. sales will flourish.

Lastly, there is the nature of the beast itself: The home air conditioning business is a young, vigorous one that is very different from other industries. It has barely sold 1% of its available market, and is an important part of the electrical industry, which is growing at twice the rate of the rest of the economy. Utilities will look forward to air conditioning to consume an increasingly larger part of their rapidly expanding load.

NEMA Announces Fan Promotion for '57

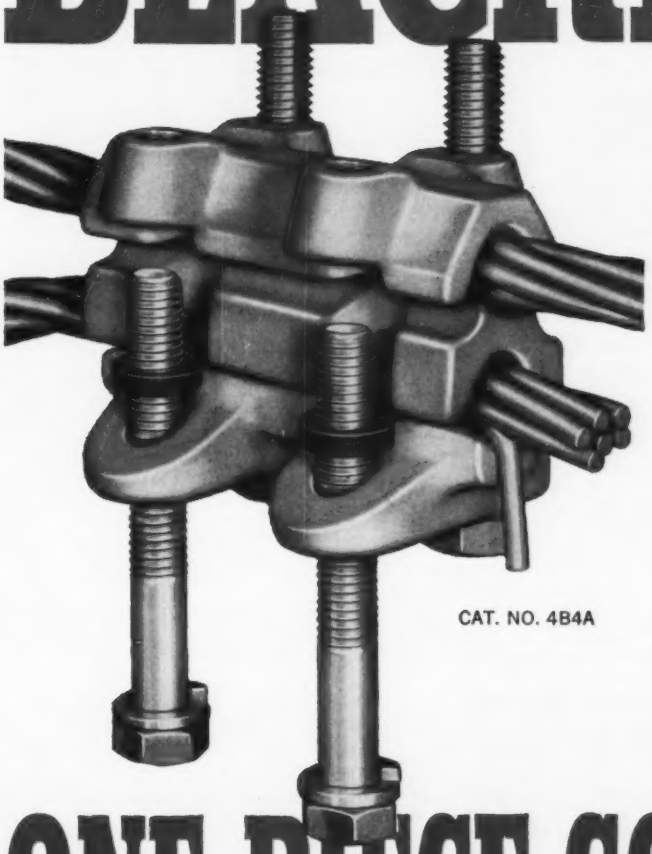
Electrical Fan Section of NEMA has announced its early season fan selling promotion for 1957. Centered around "May Days are Fan Days" contest, the promotion is aimed at boosting fan sales before the hot weather arrives.

The contest is one in which dealers arrange electric fans in window displays. Displays must be installed sometime during the month of May. Dealers must use the poster "May Days Are Fan Days! Buy NOW for LOW COST COOLING!" Photographs of the window display should be sent to NEMA, Electric Fan Section, 155 E. 44th Street, New York 17, N. Y., and must be postmarked not later than midnight, June 15th. Prizes total $3,000 in U. S. Savings Bonds.

(More Selling on page 74)

It's New! Installs quicker...easier

BLACKBURN



CAT. NO. 4B4A

It's here... a heavy duty one-piece 4-bolt connector with all the electrical and mechanical advantages of a U-bolt connector... yet much easier to install.

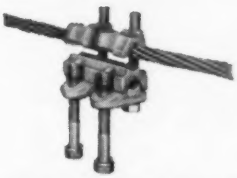
No bothersome nuts, washers, housings, spacer to take apart and assemble. Just three quick, easy steps and installation is completed.

Housings are of non-copper-bearing aluminum alloy. Spacer of soft aluminum pig protects conductor, aids conductivity. Spacer treated with heavy coating of oxide inhibiting compound. Hardware is high strength aluminum alloy completely alumilited to prevent seizing.

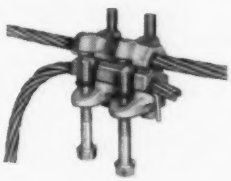
WIDE RANGE...
Accommodates conductors—2/0 to 397.5 ACSR—3/0 to 477 MCM.

ONE-PIECE CONNECTOR

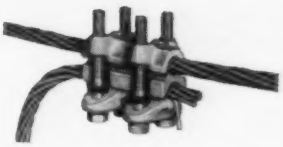
HERE'S HOW EASY THE NEW 4-BOLT CONNECTOR IS TO INSTALL



Unscrew the two free bolts contained with neoprene washers and hang over main.



Insert tap wire.



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Crapo

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

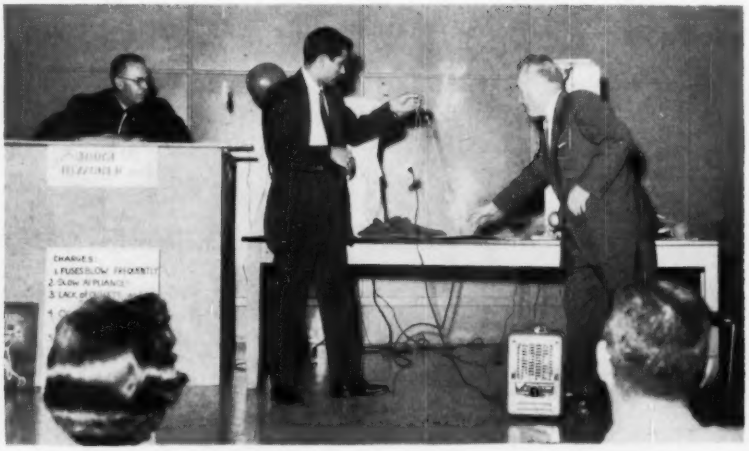
The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

INDIANA

STEEL & WIRE CO., INC., Muncie, Indiana



NEGEA Puts 'Skimpy Wiring' on Trial

New England Gas & Electric Association has come up with a clever promotion designed to carry the adequate wiring story entertainingly to the customer. Developed at Cambridge Electric Light Co, the skit is used on the NEGEA system companies and by other utilities.

The entertaining "show", which has a lot of advantages over the dry service-club monologue, is built around a mock trial. "Skimpy Wiring", alias "The Octopus", alias "Electrical Delinquent", is charged with various misdeeds, is tried, is quickly found quilty, and is banished. The audience is "summoned" to appear as witnesses. The skit is now several months old, and has been well received.

SMUD Checks Wiring, Then Tips Off Contractor

Free Housepower rating and wiring check may result in 60% of interested residential customers installing better wiring. This is the estimate of Sacramento (Calif.) Municipal Utility District, which recently offered the free service to its customers. In two months' time, 1,000 queries have been received from among the District's 105,000 or more residential consumers.

The SMUD campaign is a continuing one, with spot announcements on radio or television in alternate weeks and weekly newspaper ads. The program aims to acquaint home owners with the need for better wiring and thus sell them on wiring modernization.

Customer queries are answered in person by SMUD personnel, who make the wiring check. Bonefide prospects then are turned over to electrical contractors through the Sacramento Valley Electrical League. SMUD personnel report that about 75% of the first 400 customers checked eventually will have their home wiring modernized.

Survey Shows What Appliances EAs Sell

Water heaters, ranges and light bulbs are the leading items merchandised by rural electric cooperatives to their farm customers, according to a recent survey in Farm Power magazine. Following these three are refrigerators, freezers, electric blankets and washing machines.

Of the 988 REAs queried in the survey, 508, or 51.4% gave detailed answers on their appliance merchandising practices. 26.4% merchandise appliances, with 95.7% dealing with brand names.

(More Selling on page 79)

VAREX

..EVERYTHING YOU WANT IN A CAPACITOR

Here's why you'll like the new VAREX Capacitor

... internal discharge resistors for safety of operator

... highest grade paper dielectric

... low-temperature-type askarel insulating liquid

... annealed aluminum foil

... FOIL COOLING ASSURES EFFICIENT DISSIPATION OF HEAT

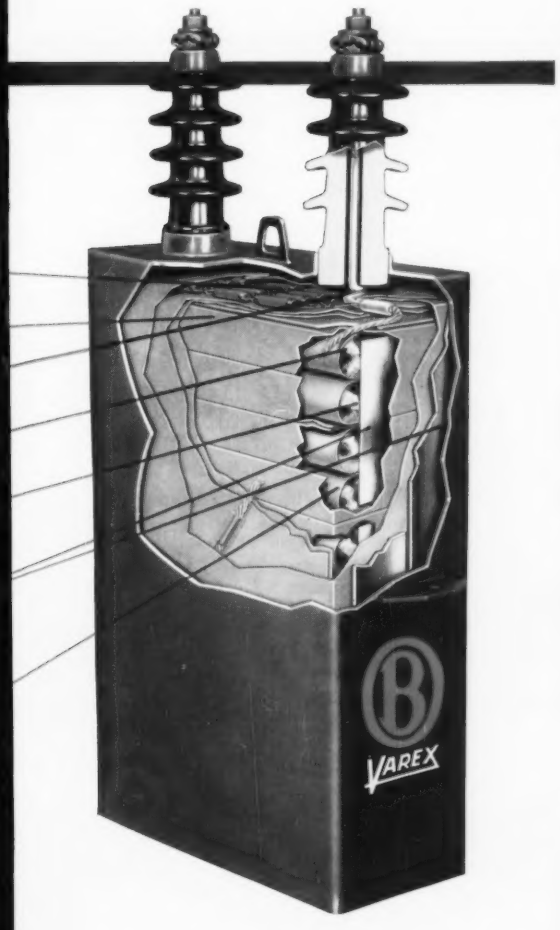
... spring pressure holds plates in contact with foil ends . . . no need for buried tabs with their crimped, soldered or welded connections

... horizontal position of elements facilitates cooling, allows elements to be short and structurally sound

ON THE INSIDE

ON THE OUTSIDE

- ... low silhouette . . . Varex meets all limiting NEMA dimensions, is shorter than most capacitors.
- ... safety-strip terminals protect stud, bushing and seal.
- ... long-leakage-distance bushings made of O-B wet process porcelain.
- ... effective solder-seal fastens bushing to case.
- ... big, open lifting eye to accommodate wide range of hooks and clevises.
- ... new epoxy-resin paint has indicated life of several times that of paint normally used on this class of material.
- ... extra-large nameplate for easy identification.
- ... recessed bottom to protect against scratching during handling.



Varex elements are wound in air-conditioned plant to insure quality and uniformity of product.

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... available in both 25 and 50 KVAR units.

... eight voltages for each KVAR rating — 2400, 2770, 4160, 4800, 6640, 7200, 7620, 7960.

... NEMA Standard hangers for one, two, three or four units.

... factory-assembled, pole mounted equipments with in-line or rectangular configuration, up to 12 units switched and unswitched.

... factory-assembled, substation equipments for building banks of any desired size.

... units, hangers and equipments meet all national standards for dimensions and performance.

ASK YOUR O-B DISTRICT MANAGER FOR COMPLETE CATALOG INFORMATION ON NEW VAREX

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O-B Varex... a complete line of Shunt Capacitors to fill all your needs

Including Substation and Pole-Mounted Equipments made to NEMA standards

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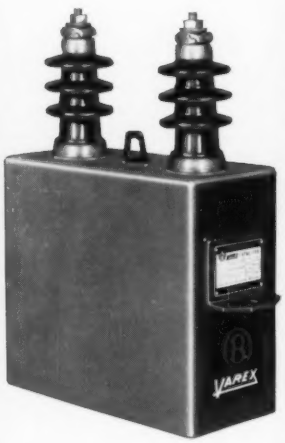
4754—H

50 KVAR

for 4800, 6640, 7200, 7620 and 7960 volts.

for 2400, 2770 and 4160 volts.



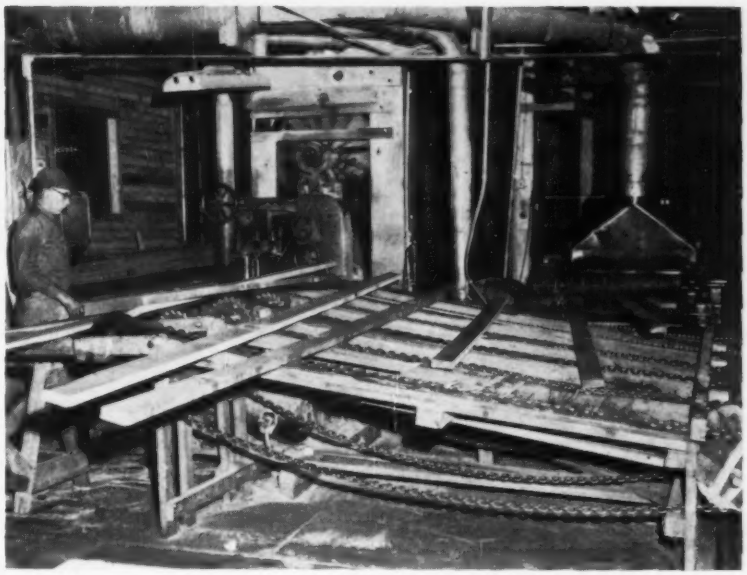
25 KVAR

for 4800, 6640, 7200, 7620 and 7960 volts.

for 2400, 2770 and 4160 volts.

Furniture Maker Mechanizes, Saves $2,500

CHARLES MILLAR, Industrial Sales Engineer, Pennsylvania Power & Light Co, Luzerne, Pa.



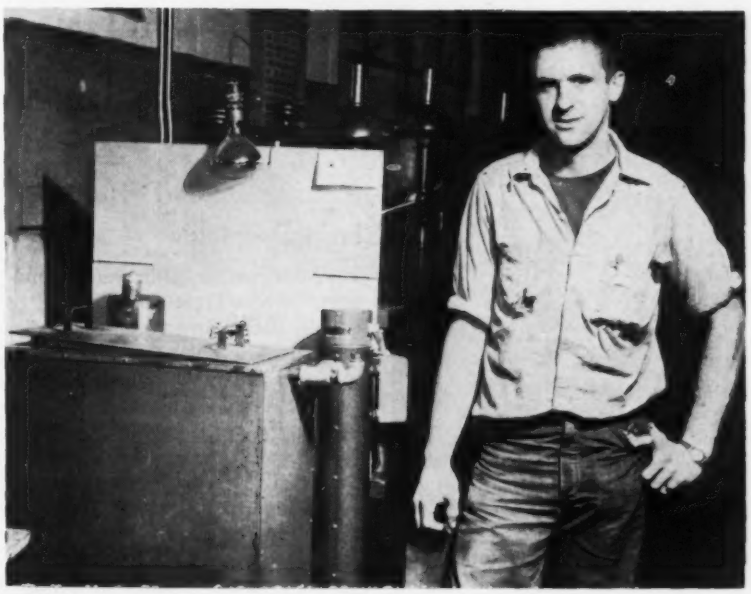
A chain conveyor, carrying lumber from a planer to a resaw machine at the S. J. Bailey & Sons Co, Honesdale, Pa., has released one man for other work and produced an estimated $2,500 per year savings. Bailey's principal product is unpainted furniture.

The conveyor consists of five large link chains, spaced two feet apart which run over sprockets on an upper and lower shaft. The receiving end of the conveyor is set near and 18 inches below the discharge end of the double head planer. As the lumber comes out of the planer, it extends out over the conveyor until planing is completed. It then falls on the chains and is carried up a slight incline to the resaw operator. A 3-hp motor with a gear reduction box drives the conveyor.

Resaw machine and planer are located parallel to each other. The conveyor runs at right angles between the two. Prior to the installation, one man was kept busy carrying lumber to the resaw machine as it came off the planer.

Steady Electric Heat Essential For Quality Tools

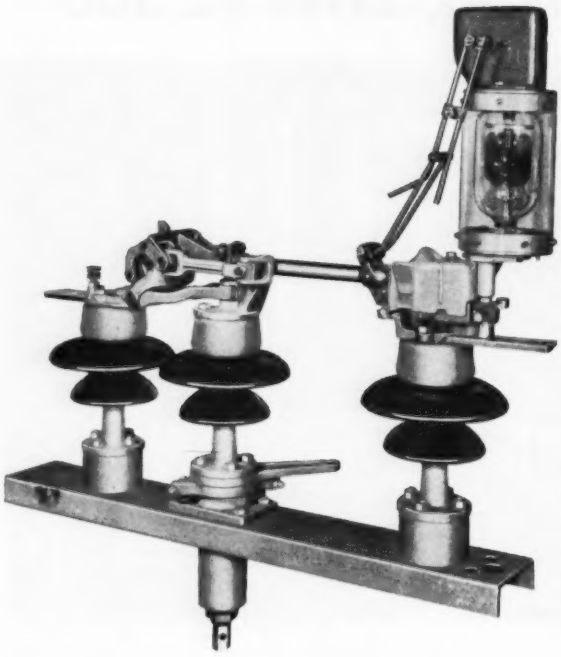
JAMES A. ACKERMAN, Power Sales Engineer, New York State Electric & Gas Corp., Lancaster, N. Y.



SIDEARM HEATER and circulating oil hold tank of plastic at even temperature. Screwdrivers, nutdrivers dipped in plastic get smooth coating of insulation.

An oil jacketed dip tank was the key to smooth even coatings of shank insulation on screwdrivers and nutdrivers manufactured by the Xcelite Corporation, Orchard Park, N. Y. The insulating plastic, a cellulose acetate butyrate, must be held between 145F and 150F to assure a good coating.

A 4-kw sidearm electric heater located adjacent to the dip tank and controlled by a thermostat, heats the oil. A ¼ hp pump circulates the hot oil through the oil jacket surrounding the dip tank. The smooth, even electric heat boosts product uniformity. The installation was made by the Xcelite's plant maintenance department. When regulation is inadequate, bubbles form on the product.



Vacuum Interrupter Switch

These vacuum interrupter switches are available for service from 7.5 to 230 kv. They are reportedly capable of interrupting loads with power factors from zero, through the entire leading power factor range, to 0.85 lagging. Manufacturer claims switches can interrupt 50 amp 10,000 times, 100 amp 5,000 times, and 2,500 amp one time.

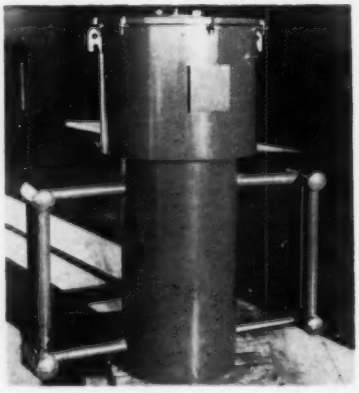
The vacuum switching equipment consists of a conventional gang-operated disconnect switch equipped with a vacuum interrupter unit. For operation between 15 and 34.5 kv, vacuum interrupter units can be added to existing gang switches in the field.

The switches are said to have been tested in capacitor banks as large as 5,000 kvar without a failure and to require little maintenance. A technical paper describing the switches is available on request.

Hi-Voltage Equipment Co, 4000 E. 116th St, Cleveland 5, Ohio.

Burial Transformer

Designed to be completely buried, with the top 3 to 4 ft below the surface of the ground, these oil immersed, earth-cooled transformers are intended for residential areas. Single-phase units are available in 15, 25, 37.5, 50, 75, and 100-kva models; three-phase units in 45, 75, and 112.5-kva models.



Primary circuit enters tank through wiping sleeve or stuffing tube and may be single, concentric or 3-conductor cable. Secondary connection permits voltage variation correction at the residence switch box.

These double sealed units have wing-type cooling tubes and include space for adding a fused disconnect switch. Manufacturer claims they can absorb high overloads and have low maintenance costs.

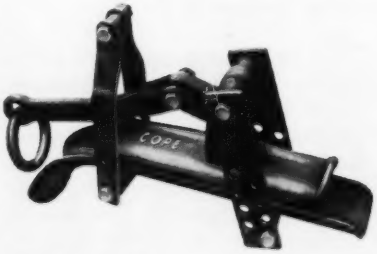
Electrical Service Co, P. O. Box 1039, Greenville, Texas

Pole Fungicide

A fungicidal oil-in-water emulsion, Wood-Treat is said to be equally useful for treating new poles or re-treating poles that are already in place. It has the appearance and consistency of mayonnaise and can be applied with a paddle or other mechanical device. The emulsion acts as a reservoir for a compound containing 10% pentachlorophenol and is reported to eliminate the need for wrapping after re-treating.

Manufacturer claims the product is safe, penetrates deeply, and has good retention. It is shipped in 8, 40, and 200-lb drums and can be used through a wide temperature range. Bulletin No. 1300 gives comprehensive technical data.

Wood Treating Chemicals Co, 5137 Southwest Ave, St. Louis 10, Mo.

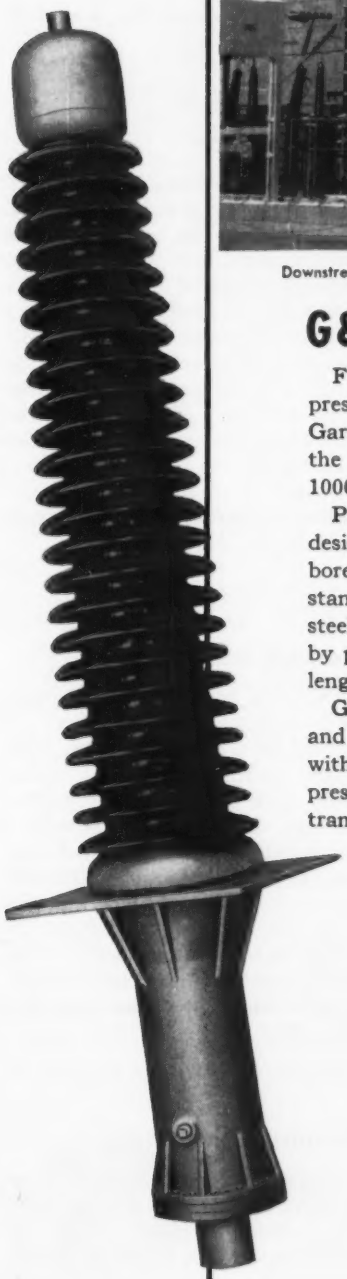


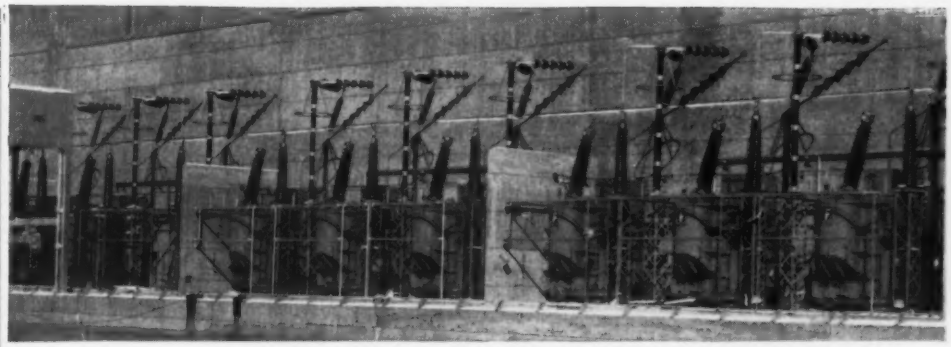
Cable Puller

A heavy duty cable pulling rigging that will handle 2.5 and 3-in. cables is available for salvaging underground cables. The puller applies a strong, positive grip which can be readily released by slackening the winch line.

T. J. Cope, Inc, Third & Walnut St, Collegeville, Pa.

(More New Equipment on page 82)





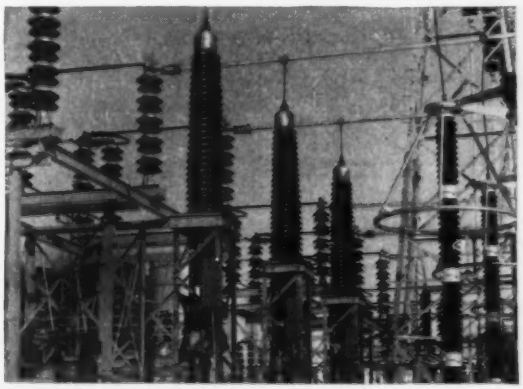
Downstream side of power house at Garrison Dam with transformer banks and 230 Kv. oil pipe cable potheads.

G&W 230Kv. POTHEADS PROVEN IN SERVICE

First in U. S. A. are the G & W Type "ATA" potheads on the 230 Kv. high pressure oil pipe type cables installed in 1955 at the Army Corps of Engineers Garrison Dam on the Missouri River in North Dakota. The 230 Kv. cables connect the main transformer banks for generators 1, 2 and 3 to the 230 Kv. switchyard 1000 feet distant.

Proper treatment of mechanical and electrical stresses permit a simple G & W design. Full 200 pound pipe line oil pressure is retained by the relatively small bore porcelain shell. Tested at 500 p.s.i. pressure. No castings are used for withstand of pressure. Top and bottom fittings are fabricated, non-magnetic, stainless steel—sealed by fully retained "Resistoyl" gaskets. Stress relief cone, supplemented by porcelain stress control tube, makes efficient use of the internal diameter and length of porcelain shell—and reduces the amount of installation labor.

G & W regularly furnishes potheads and joints for oil and gas filled cables, high and low pressure. Full cooperation is given to users and to cable manufacturers with respect to varying details of devices. For example, Type "ATA" (high pressure) and "ATL" (low pressure) potheads can be furnished with current transformers for metering.



230 Kv. potheads in Garrison switchyard where oil pipe cable is brought from power house transformer deck.

G&W ELECTRIC SPECIALTY COMPANY
3500 W. 127th ST., BLUE ISLAND, ILLINOIS

A573

Representatives in many cities of U. S. A., N. & S. America Canadian Mfr. – Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

High Voltage Cable Terminating, Sectionalizing, Protecting, and Connecting Devices

POTHEADS • BOXES • OIL FUSE CUTOUTS • LOAD BREAK OIL SWITCHES • SPLICING KITS

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preferred by linemen
. . . electricians

When it comes to leather goods for linemen or electricians, the name Klein today stands for the highest in quality as it has since the first wires were strung.

In Klein-Kord, too, Klein offers to industry the first specially woven fabric for safety straps—a fabric designed to permit the use of a tongue-type buckle without the risk of slitting or ripping under severe strain.

Now in Nylon Klein-Kord safety straps Klein still leads with the newest in safety equipment specially designed for use by utilities wherever power or communication lines are strung.

Write for Free Tool Guide
A free copy of the new Klein Pocket Tool Guide will be sent to anyone interested on request.

Ask your supplier
Foreign distributor:
International Standard Electric Corp., N.Y.

Mathias KLEIN & Sons
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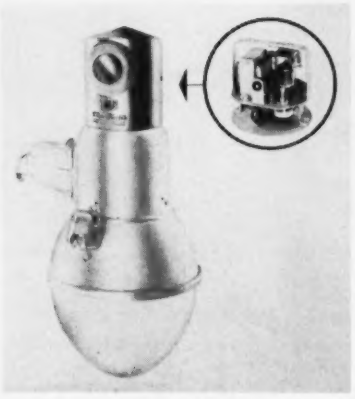
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS



Street Light Control

The Model 5910 Sunswitch street and highway light control has a turn-on range which is adjustable from 1 to 5 ft-c. A one-tube circuit contains a crystal photocell which responds to blue-green. Load capacity is rated 1 kw at 115 v ac. The electronic unit is said to have a fast-acting flip-flop circuit and to be completely isolated from the power line. Fail-safe circuit has a 1-sec. time delay. Intended for luminare, pole top, ballast, or standard mast arm installations, the unit has a weatherproof, unbreakable housing.
Ripley Co, Inc, Middletown, Conn.

Presplice Tool

Designed to complement existing popular size sleeve splicing tools, this model 4U universal presplice cutting tool handles conductors up to 1/0 ACSR and 2/0 copper or aluminum without adjustments of change pieces.

When used on ACSR, it reportedly removes the aluminum wires selectively, without damage to steel core. It is said to produce square cuts on both copper and aluminum conductors. The model 4U is available with steel or plastic-covered handles for low voltage work, but may be obtained through hot-line tool manufacturers with tested high voltage handles. Catalog No. 2201 has additional data.
Interstate Drop Forge Co, Milwaukee, Wis.

Static Switch

A plug-in,isolated input unit for static switching in industrial process control has been added to seven existing individual elements. Manufacturer reports it includes protective functions such as undervoltage protection, undervoltage release, switch volts protection, overvoltage limit, and fault indication. A magnetic amplifier, with three electrically isolated control windings—one suitable for use up to 750 v dc—provides the protective functions.
General Electric Co, Schenectady 5, N. Y.

Control Stations

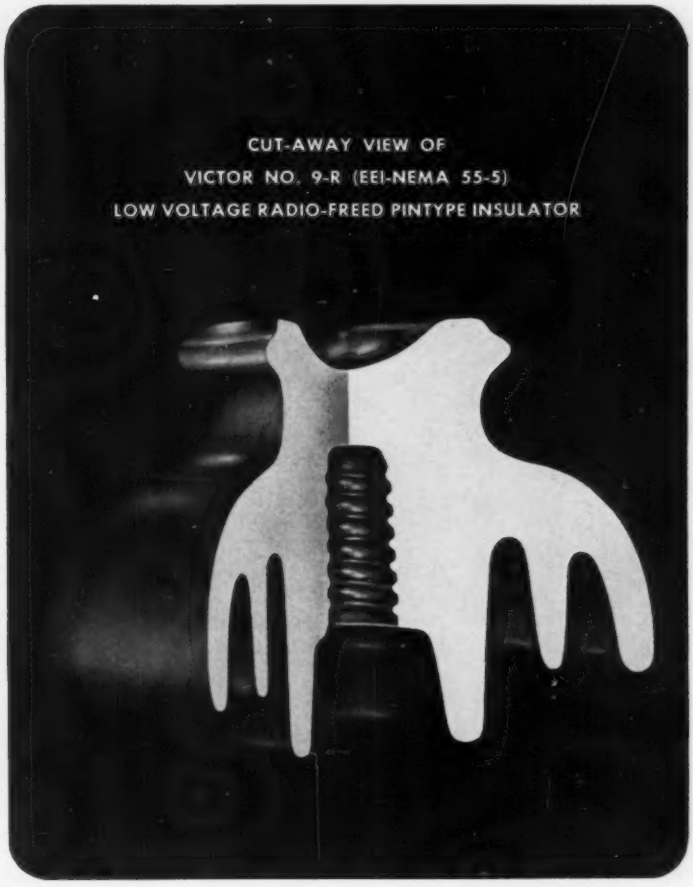
Non-seal type auto-manual pneumatic control loading stations are offered for use in combustion, feedwater regulation, pressure reduction, and desuperheating control systems. Pressure range is from 3 to 15 psig, with gages scaled from zero to 100%. "Bumpless" transfer from automatic to manual, or vice versa, is reportedly provided by simply matching gage pointers and turning an adjustment knob.
Copes-Vulcan Div, Blaw-Knox Co, Erie, Pa.

Germanium Junction

Liquid-cooled germanium junctions, rated 670 amp, 20 to 66 volts, are available for power rectifier applications in electro-plating, anodizing, copper refining, electro-tinning, steel mill processing, and numerous electro-chemical processes. Units are said to be small, reliable, and have efficiencies as high as 97%.

The manufacturer claims that six units connected in a bridge circuit will handle 4,350 amp dc. Installations requiring currents in excess of 250,000 are reported.
International Rectifier Corp, 1521 E Grand Ave, El Segundo, Cal.

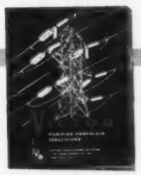
CUT-AWAY VIEW OF
VICTOR NO. 9-R (EEI-NEMA 55-5)
LOW VOLTAGE RADIO-FREED PINTYPE INSULATOR



NO INSULATOR IS MADE WITH GREATER CARE THAN A *VICTOR* PINTYPE!

VICTOR Pintypes are designed and manufactured with the same *Purified* Porcelain as high voltage units. VICTOR Pintypes are design-tested with steep front impulse wave in addition to the normal 1.5 x 40 standard impulse wave.

The conductive glaze on VICTOR radio-freed units is readily *distinguishable* and *permanent.* Accurate, die-formed porcelain threads assure ease of installation. Machine glazing guarantees uniform glaze application, giving optimum dielectric and mechanical strength. *Every* VICTOR Pintype receives the same careful routine electrical testing as VICTOR high voltage insulators. That's why—when you buy VICTOR, you just can't buy better pintypes.



New . . .
VICTOR CATALOG

Now ready for distribution is Victor's newest and most extensive catalog. One of the most complete in the field, it includes illustrations and data on many items being produced at VICTOR and not previously shown, up-to-date EEI-NEMA Standards, and an outline of VICTOR'S new plant, research, testing and manufacturing facilities. It's FREE! Write for your copy.

Nothing beats Porcelain
FOR ELECTRICAL INSULATORS!

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO., Inc.
VICTOR, N.Y.

"We needed accurate control... We got it with BUCKEYE!"

...says Raymond F. Pitman, President, Universal Pipeline Constructors, Inc.

"Our contract with Intermountain Gas Company calls for pipe installation in 17 Idaho towns," reports Raymond F. Pitman. "For close-quartered ditching like this, we need fast, accurate control. We're getting it with our Buckeyes!"

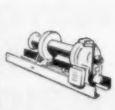
Instant control with Buckeye ditchers is the result of live-action hydraulics. Pitman says, "In really tight places, such as narrow alleys, the hydraulic conveyor drive lets us keep working right past obstacles. It also means that we can place spoil on either side and at any distance from the machine. For work over and around existing service lines, the hydraulic digging wheel hoist gives us good 'live' control. Since the digging wheel hoist and conveyor drive operate independently, adjustments can be made without stopping forward travel."

Arrange to see a Buckeye in operation . . . you'll *like* what you see! Call your GarWood-Buckeye dealer soon, or write to: Customer Service Dept., Gar Wood Industries, Inc., Wayne, Michigan.

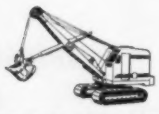
GAR WOOD INDUSTRIES, INC.

Wayne, Michigan • Findlay, Ohio

GarWood Buckeye



Gar Wood Winches



Gar Wood Excavators

Gar Wood - St. Paul Hoists & Bodies

More New Products

Corning Glass Works, Corning, N. Y., has a **coil heating unit** in Vycor sheathing for industrial heating, air conditioners, and baseboard heaters. It is available in 12, 18, 24, 36, and 48-in. lengths with ratings of 500, 750, 1,000, 1,500, and 2,000 w.

Federal Telephone & Radio Corp, 1000 Kingsland Ave, Clifton, N. J., has an Andicon **analog-to-digital converter** which instantly converts waves or graphs from charts or oscilloscopes to readable numbers.

Chemo-Textiles, Inc, P. O. Box 169, West Warwick, R. I., offers Teflon **tape** for insulation in a variety of widths and thicknesses.

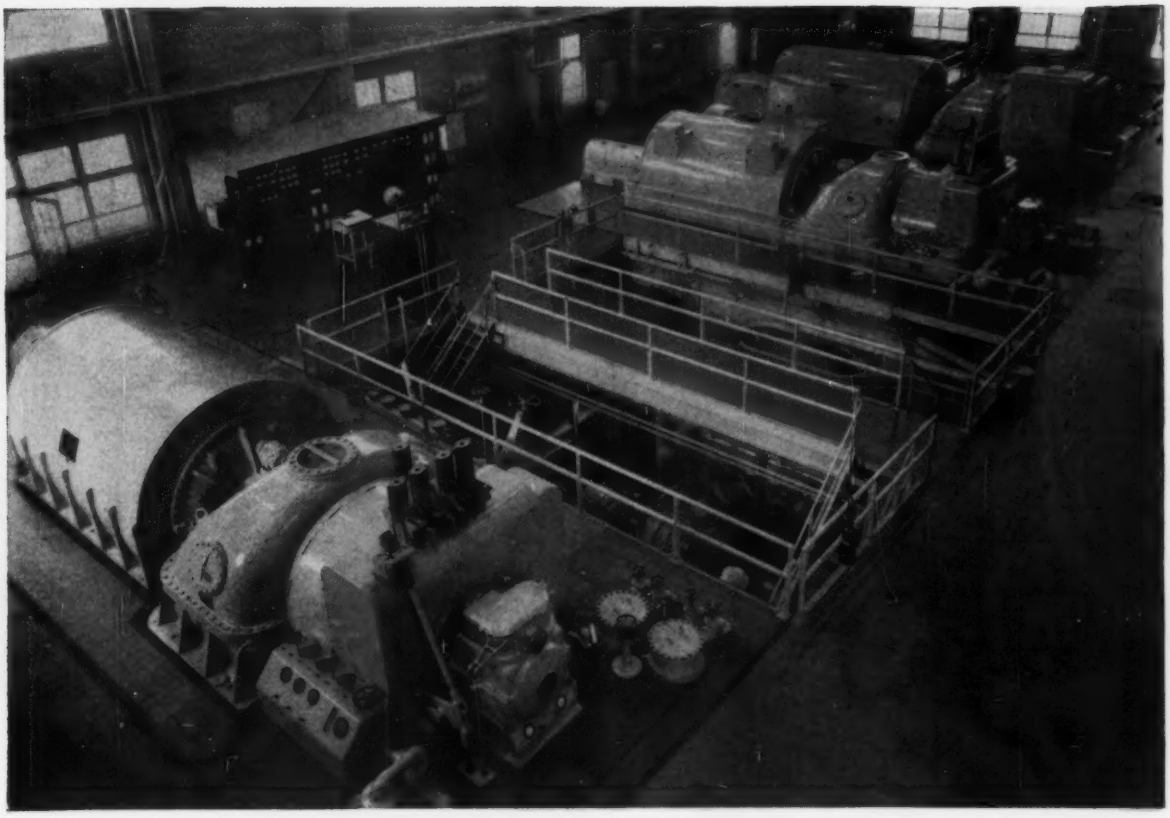
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa., offers Hipermag **magnetic cores** for current transformers and other magnetic devices. Saturation induction (B_s) and remanent induction (B_r) are 15,500 and 14,000 respectively for 60 cps, 400 cps, and dc.

The Glastic Corp, 4321 Glenridge Rd, Cleveland 21, Ohio, has Channel-Duct 3-sided **wiring duct,** in 2-in. and 3-in. heights, for use in production of control panels. Wires are laid in glass-reinforced duct, then strung through perforated sides at nearest connection point.

Jordan Co, Inc, 3235 W. Hampton Ave, Milwaukee 9, Wis., is marketing a Valvetrol all-electric rotary **valve controller,** in diameters from 0.25 to 1 in. for remote or automatic valve operation with proportional or on-off control.

Cramer Controls Corp, Centerbrook, Conn., has Type 114 high torque, permanent magnet, synchonous **motors,** in speeds from 60 rpm to 0.5 rpd and guaranteed torque of 30 oz-in. at 1 rpm.

The Electronic Tube Div of Burroughs Corp, Plainfield, N. J., is marketing the NIXIE read-out **tube** which converts electronic signals to readable characters for computer read-out, industrial control, or instrumentation.



Gulf Power Company's Crist Steam Plant at Pensacola, Florida, operates two 22,500 kw General Electric turbines, and one 30,000 kw Westinghouse. Gulfcrest went into their No. 1 turbine in 1945, their No. 2 unit in 1949, and No. 3 in 1952 . . . and has given outstanding performance from the start.

Get extra protection for your turbines with extra-refined GULFCREST

Gulfcrest keeps turbine lubricating systems extra clean—free from rust, sludge or foam. Power companies know they can get best results with Gulfcrest because it is the only turbine oil that is super-refined by the Alchlor Process. This is an extra step in refining that removes sludge-forming hydrocarbons. After the finest crude oils become a highly refined turbine oil, the Alchlor Process actually discards about 15% *more* of it—to achieve the unmatched quality of Gulfcrest.

Gulfcrest has been used continuously in some turbines for 20 years—with no significant change in its neutralization number. Your Gulf Sales Engineer will recommend the proper grade of Gulfcrest for you. He's at your nearest Gulf office.

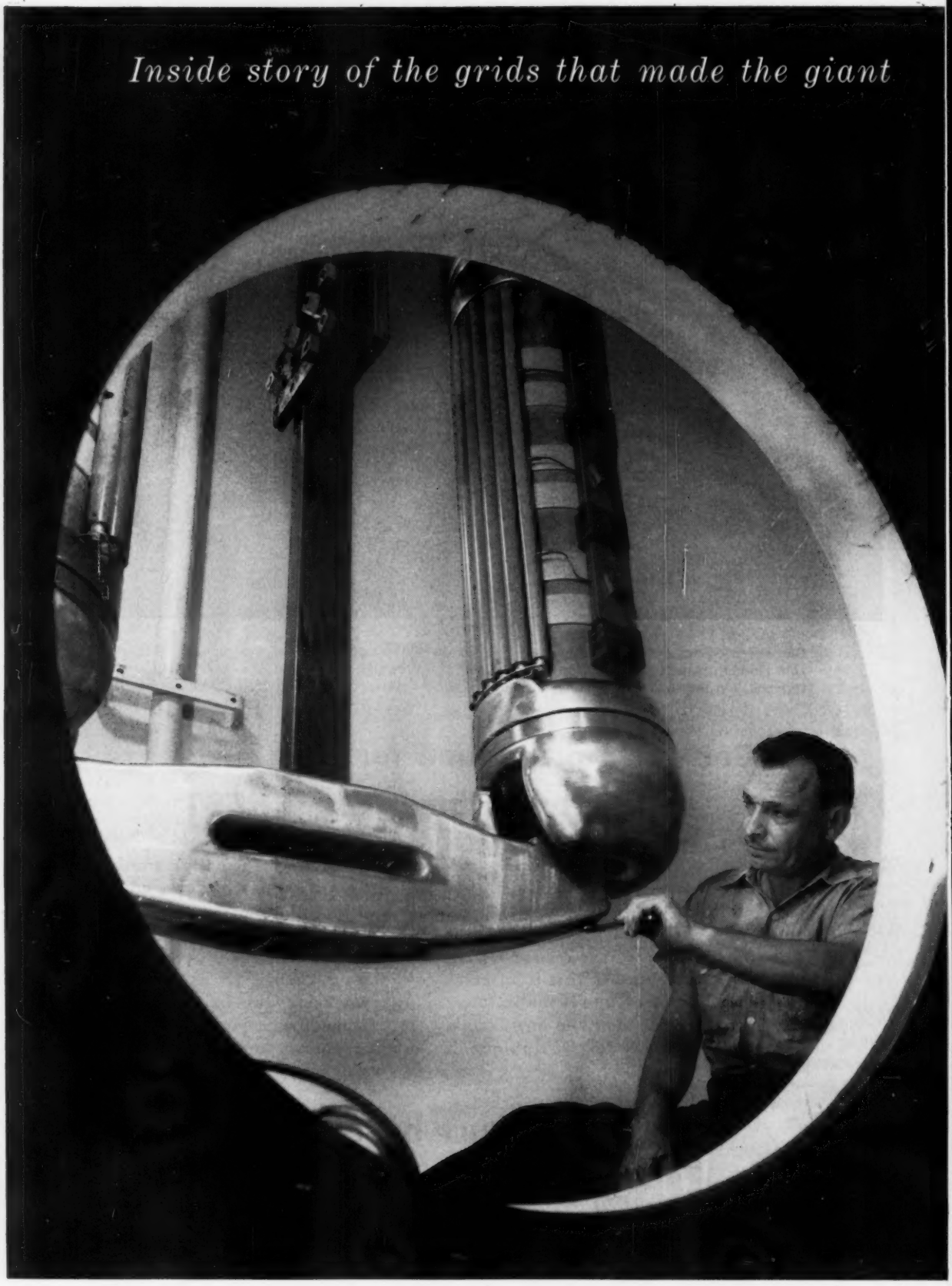
GULF

GULF OIL CORPORATION

1822 Gulf Building, Pittsburgh 30, Pa.

The Finest Petroleum Products For All Your Needs

Inside story of the grids that made the giant



NOW AT RATINGS DOWN TO 69 KV

The Westinghouse tubular, multi-break interrupter, only two years ago, made possible the world's first 330-kv, 25-million-kva circuit breaker.

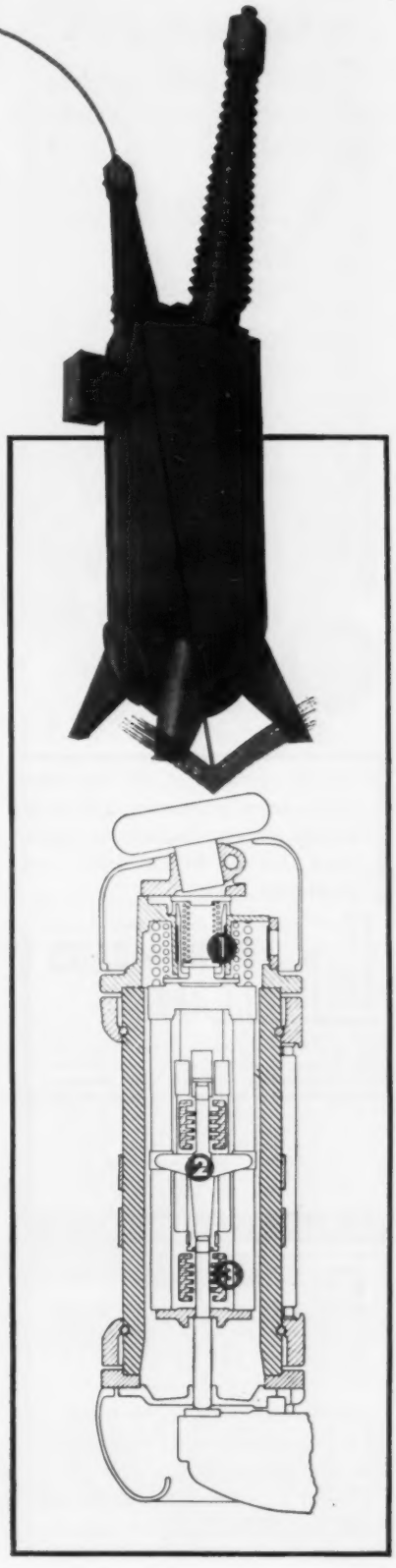
Now, this same tubular interrupter is applied to breaker ratings of 69 kv (3½ million and 5 million kva), 138 kv (10 million kva), 161 kv (15 million kva) and 230 kv (15 million kva).

Another big plus is the extremely simple inspection and maintenance procedure. Interrupter blocks—two to eight per pole—may be removed by loosening only a few MICARTA® bolts. With the blocks removed, both the stationary fingers and the moving contacts are visible. They can be replaced, if necessary, with the tubular shell still mounted on the bushing—without loss of contact alignment. Interrupter blocks are identical in all ratings from 69 kv through 330 kv. Contacts and fingers for ratings above 138 kv are also interchangeable. Spare parts inventory is reduced to a minimum.

Tubular multi-break grids provide excellent line-dropping and capacitor-switching characteristics—proved in laboratory and field tests. The integral oil-driving piston assures fast extinction of low-current arcs. Grids are simple to install—and in some instances can be added to existing breakers. All the details are available from your Westinghouse sales representative—or you may write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa., for descriptive literature. J-60912

YOU CAN BE SURE...IF IT'S

Westinghouse



Sectional view at left shows interrupter top casting assembly with ① oil driving pump, ② contact assemblies, ③ fibre interrupter blocks and other essential design features.

NEW
WRIGHT Type "C"
Block Chain Ratchet Lever Pull-A-Way

FEATURES

- **Hooks are drop-forged**
- **Special alloy-steel chains**
- **Chain sheaves of drop-forged alloy steel**
- **Gear teeth cut to precision limits**
- **Load brake is dependable and safe**
- **1½-ton Pull-A-Way (pictured) weighs only 23½ pounds**

THREE SIZES 1½, 3 and 6 TONS

Write to York, Pa., office for complete information

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HOW RATES ARE SET

Thorough, practical guide to economic and technical factors of electric utility rate making. Gives fundamentals of electric utility business; discusses theoretical basis of price structure and tariff, engineering economics and cost analyses, the rate department, earnings, utility plant, depreciation, rate of return, etc. Detailed methods; many data. **Electric Utility Rate Economics.** By R. E. Caywood, Mgr. of Rates, West Penn Power Co., 248 pages, illus., $10.00.

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CATALOGS—BULLETINS

• **FEEDER-BUSWAY:** A new combination feeder, plug-in busway rated from 600 to 4,000 amp, 600 v or less, is described in a 4-page bulletin, GEC-1446, available from Advertising and Sales Promotion, Distribution Assemblies Department, General Electric Co, Plainville, Conn.

• **GARDEN LIGHTING EQUIPMENT:** Bulletin No. 137-57 covers the line of garden and play-area lighting equipment made by Steber Mfg Co, Broadview, Ill.

• **BOILER FEED WATER REGULATOR:** Bulletin No. 1028 describes the manufacturer's Type P regulator for remote control of boiler feed water in stationary and marine service. Write Copes-Vulcan Division, Blaw-Knox Co, Erie, Pa.

• **ALUMINUM EXTRUSION PRESSES:** A 6-page bulletin that covers its aluminum extrusion presses has been published by Watson-Stillman Press Division, Farrel-Birmingham, Inc, Roselle, N. J.

• **EXPANSION JOINT:** The Yarway Type W Gun-Pakt Expansion Joint is described in a brochure issued recently by the manufacturer, Yarnell-Waring Co, Philadelphia 8, Pa.

• **CONTROL VALVES:** Specifications No. S810-11 and S810-12 describe the construction details of single and double-seated Honeywell Series 800 Diaphram Control Valves. Request from Minneapolis-Honeywell Co, Valve Division, Philadelphia 23, Pa.

• **INDUSTRIAL MATERIALS SELECTION CHART:** An industrial materials chart, listing application and descriptive information, including data on adhesives, coating and sealers has been prepared by Miracle Adhesives Corp. Write the company at P.O. Box 466, New Philadelphia, Ohio.

• **PORCELAIN ENAMELED PARTS:** "Porcelain Enamel in Industry" is the title of a 20-page cartoon-illustrated booklet that deals with the origin, development, and uses of porcelain as an industrial material. Copies are available from Erie Ceramic Arts Co, 3120 W. 22nd Street, Erie, Pa.

• **TRANSISTORIZED COMPUTOR:** A 12-page descriptive brochure covering its transistorized computor TRANSAC type S-2000 has been issued by Philco Corp, Government & Industrial Division, 4700 Wissahickon Avenue, Philadelphia 44, Pa.

• **AIR FILTRATION:** "High Efficiency Air Filtration" is the name of a new bulletin which shows comparable efficiencies of various filters, defines high-efficiency filtration, and gives basic information on filter selection. Ask for Bulletin 120 from Cambridge Filter Corp, 738 E. Erie Blvd, Syracuse 3, N. Y.

TECHNICAL LITERATURE

AIR CONDITIONING & REFRIGERATION—The Air Conditioning Refrigeration Data Book Applications, 1956-57 has recently come off the press. Published by the American Society of Refrigerating Engineers, this volume is the sixth edition of a continuing series of *Applications Volumes*, first published in 1940. It describes in detail the science of refrigeration and the recommended practices to specific problems in the refrigeration and air conditioning fields. Its 60 chapters have been written and put together by eminent authorities in their respective fields. Current technical and new design information have been included. Information about the Society and its publications is also included. The book contains an elaborate index. Price: $10.00 in the U. S. Address the American Society of Refrigerating Engineers, 234 Fifth Avenue, New York 1, N. Y.

ARC WELDING—The Eleventh Edition of "Procedure Handbook of Arc Welding Design and Practices" has recently been published by Lincoln Electric Co. It represents a major revision of this reference book; all material has been reviewed and brought up to date. Arranged in eight sections for easy study, the book covers all phases of arc welding. Each section has its own table of contents and a complete index for the entire book is included. 1,300 pages, $3.00. Write Lincoln Electric Co., Cleveland 17, Ohio.

STEEL CROSSARM BRACES—"Specifications for Steel Crossarm Braces, TD-6, 1957," has been issued by EEI. Approved by the Transmission & Distribution Committee of EEI, the specs are intended to be used by member companies as an aid in preparing their own specifications, and as engineering information with the expectation that they may be useful in promoting uniform practices. Write Transmission & Distribution Committee, Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y.

ZINC GALVANIC ANODES—American Zinc Institute has published two reference manuals describing the use and application of zinc as a galvanic anode to protect iron and steel from corrosion. Developed with the help of Ebasco Services, Inc, the new AZI books are entitled, "Zinc as a Galvanic Anode Underground" and "Zinc as a Galvanic Anode Underwater." The first, a 40-page affair, discussed the theory and practice of zinc anode uses in transmission line towners, ground rods, grounding cells, and domestic oil tanks. Both publications are available without charge from American Zinc Institue, Inc, 60 E. 42nd Street, New York 17, N. Y.

INSTRUMENT TRANSFORMERS—A 24-page booklet, "Instrument Transformers-Theory and Operation", has been released by A-C. Of special interest to utility metering superintendents, industrial electrical engineers and switchboard builders, it deals with metering applications, gives ASA standards, and shows typical performance curves. Request Bulletin No. 61S8528 from Allis-Chalmers Mfg Co, Milwaukee 1, Wis.

IT'S FASTER WITH FARGO!

FASTER!
BETTER! SAFER!

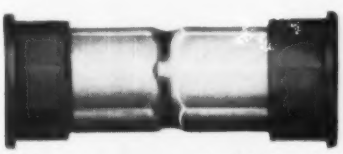
Faster? You bet! Fargo Service Compression Connectors fit right . . . work right . . . are precision made. Solid center wall automatically measures conductor to be inserted. Exclusive octagonal shape requires less effort to compress.

Better? Yes sir! They're longer . . . they have uniform mechanical and electrical characteristics . . . their solid barrier eliminates galvanic corrosion between dissimilar conductors . . . they're filled with Fargolene, an oxide inhibitor.

Safer? Absolutely! Extra length allows for easier handling . . . space for three compressions on a side . . . installed easily with Fargo's lightweight "one-hand" tool.

Everything about the Fargo compression connector is better. Check and compare.

ASK YOUR LINE MATERIAL FIELD ENGINEER FOR COMPLETE DETAILS.



Fargo aluminum color coded compression connectors are available in two sizes . . . 1/2", 12E Series, for conductors from #8 solid through #2 ACSR . . . 5/8", 58E Series, for conductors from #8 solid through 1/0 ACSR.

Distributed by
LINE MATERIAL INDUSTRIES
(A McGraw Edison Company)
Milwaukee, Wisconsin
In Canada, CANADIAN LINE MATERIALS, LTD., Toronto, Canada

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie
New York

FARGO

Cost-Cutting Pair. Here's how Rome's aluminum Triplex can be teamed up with Rome's Type SE cable in order to achieve maximum installation economies.

Additional savings on your service drops now possible with Rome's aluminum Triplex

You can reduce the cost of overhead distribution service by installing Rome's aluminum Triplex. Here's how it saves you money:

1. Costs less. Initial cost is lower than conventional copper Type SD service drop cable.

2. Cuts down installation time. Because of its light weight, Rome's aluminum Triplex is easier to handle and install.

3. Lasts longer. Maintenance and service interruptions are few compared to open-wire installations. It offers maximum resistance to storms, wind, and ice loading.

Specify Rome's aluminum Triplex for your next service drop installation. Contact your nearest Rome Cable representative for more information—or write to Department 364-A and ask for Bulletin RS-5.

If voltage drop is not a problem . . .

Save up to 15% on cost of 100-amp service for new housing with Rome's improved SE cable

You can now substitute No. 3 AWG copper conductors for the more expensive No. 2 AWG in 100-ampere service locations where voltage drop is no problem. U/L approval of Rome's improved Type SE service entrance cable for 75°C. operation makes this dollar-saving substitution possible. You can save up to 15% of the cost of installing 100-ampere service.

Easy to use. Approved for high-temperature operation in *either dry or wet locations* when insulated with Rome's heat- and moisture-resisting compound. You'll find Rome's Type SE cable easier to handle because of its lighter weight. Saturated cotton braid—one red and one black—over each conductor provides quick and positive conductor identification. Its neat, neutral-gray finish readily blends with the outsides of most homes, and it can easily be painted when necessary. The over-all outer braid is both flame- and moisture-resistant; and—for identification—it's surface-printed: "SE-Style-U 75°C." It resists becoming tacky, even under severe storage conditions.

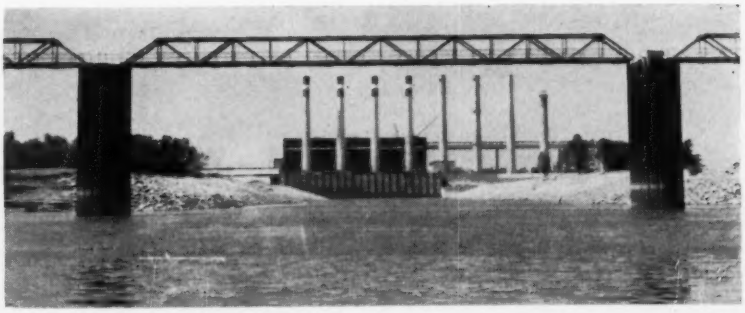
Specify Rome's service entrance cable for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 364-A and ask for Bulletin SE-1. Rome Cable Corporation, Rome, New York.

ROME CABLE

CORPORATION

Opposition to TVA's revenue bond expansion plan mounts

House unit scores proposed "after the fact" control by Congress, possible Treasury liability, rising steam plant expansion as it debates:



Who Will Finance TVA's Plants?

By this week it became fairly clear in Washington that Tennessee Valley Authority is going to be thwarted again in a bid for sanction to expand by issuing its own revenue bonds.

The atmosphere is definitely chill for legislative proposals that would cut loose TVA from Congressional apron strings, leaving it to chart its own financial course.

Two Bills Under Study

The House Public Works Subcommittee on Rivers and Harbors is considering two identical bills by Democratic Reps Cliff Davis (Tenn.) and Robert E. Jones (Ala.). They provide that:

- Provisions of the TVA Act would be suspended to require repayment within 40 years of the federal government's appropriated investment in TVA's power facilities.
- In lieu of amortization payments, TVA would make semiannual payments into the Treasury in, at least, the amount of interest accruing against the $1.2-billion unpaid balance of the government's appropriated investment. Interest rate would be variable, representing at each period the current average cost of all government borrowing rates.
- Under these conditions, TVA would be in a position to devote most of its power revenues to retiring 50-year bonds, which it could issue in unlimited amounts "for construction, acquisition, enlargement, improvement, or replacement of power generating and transmission facilities" or for lease or lease-purchase of power properties or other power contracts.

At the outset it seemed opportune that Davis was also chairman of the rivers and harbors subcommittee. But for health reasons he missed all the early hearing sessions.

More importantly, there is no evidence he has engaged in any offstage maneuvers to round up votes the bills obviously need to even be voted out of the subcommittee, not to mention the larger hurdle in the full Public Works Committee.

As chairman of the group that exercises life-and-death powers over "pork barrel" projects so dear to hearts of Congressmen and their constituents, Davis is in position to apply friendly leverage in behalf of TVA. But those in the know at the Capital say he hasn't done it.

From the testimony of Jones and G. O. Wessenauer, TVA's manager of power, in the initial sessions there was developed this picture of the agency's present status and plans:

- As of March 1, TVA had installed capacity of 9.63 million kw.
- Seven units under construction at existing plants—four at Johnsonville, two at Gallatin, one at John Sevier—will raise system nameplate rating to 11.24 million kw when put on the line by late 1959.
- After 1959, estimates of civilian load growth in the area show a need for annual addition of 750 Mw for the next several years.
- Annual expansion would cost $150 million a year. Half would be raised by bond issues, half would be power revenues reinvested.

Republicans Oppose Measure

Republican hostility to the measure was evident from the outset. Neither Jones nor Wessenauer made apparent headway in countering it. Under close questioning by Rep Peter Mack (R-Ill.), Wessenauer agreed that only about 500,000 kw of potentially economic hydro power remains to be developed within the TVA area and that steam power will have to take care of most future needs.

Republican opponents hammered hard on these points: Congress would lose effective control over TVA's operations and would, at best, only have a chance to review them "after the fact;" there is divergence of opinion about whether TVA bonds, in event of default, would become a liability of the U. S. Treasury; there is no limit on the amount of bonds some irresponsible future management of TVA might issue in any one year.

However, Rep J. Harry McGregor of Ohio succeeded in eliciting one concession from Jones: Jones agreed he would be willing to consider an amendment that would specify any bond issues would not exceed amounts required to serve the load growth in TVA's present service area.

TVA partisans have more than GOP opposition in the subcommittee to overcome. Yet to be heard from is the Budget Bureau, which is expected to align itself with the opposition. Also silent is the Senate, where there has been not a legislative wheel in motion on this topic.

Significantly, the Administration is not inclined to make any move in behalf of TVA. Last year, it submitted a counter-proposal to the Davis-Jones legislation: a $750-million limit on TVA bonds outstanding at any one time, and treasury-Congress review of bond issues.

ON THE LINE...

New Hubbard Faultmaster Keeps Pace With Growing Systems!

HUBBARD
Small bore single vent tube provides high pressure positive expulsion. Fibreglass reinforcing assures long tube life.

Proper application of fuse cutouts is greatly simplified by the use of the new Hubbard Faultmaster. The design leads the industry with a new single vent, small bore, fibreglass-reinforced fuse tube. Flippers, flying caps, tricky vents and other remedial accessories are not required. Without "blind spots," the Faultmaster is able to clear faults from a few amperes through its maximum rating. Future obsolescence can be avoided now, for the great flexibility of the Faultmaster provides superior protection for today's system and, without extra cost, has the built-in-reserve for operation on the system of tomorrow.

Unique, high strength recoil members and husky fasteners absorb, minimize and distribute the stresses of high fault interruption over the sturdy, solid porcelain column. The entire current path is silver plated and current transfer points are under spring pressure. Springs are made from non-aging materials and designed to operate well below their elastic limit to insure positive contact pressure throughout the useful life of the cutout. All working parts are of corrosion free non-ferrous materials. Get the full story today from your Hubbard distributor or write for a copy of Bulletin P-756.

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Triumph over Channel Chatter

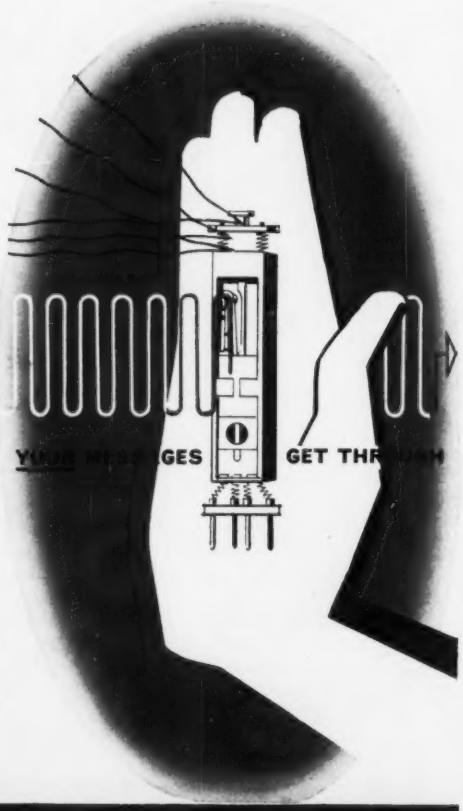
with PRIVATE-LINE

2-Way Radio

GIVES YOU GREATER RANGE, MAXIMUM PROTECTION AGAINST NUISANCE AND SKIP INTERFERENCE

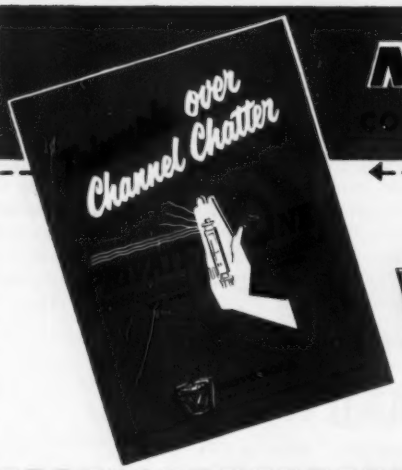
Truly a new dimension in two-way radio communications—the result of years of extensive engineering and "on-the-job" field testing. PRIVATE-LINE radiophone incorporates an entirely new circuitry concept which provides privacy from interfering signals and unwanted co-channel messages. Now you can "get off the party line." No longer is it necessary to listen to a constant stream of "channel chatter" over the loudspeaker. PRIVATE-LINE radiophone is *completely quiet* except when receiving a call from another PRIVATE-LINE radiophone in the same operation.

- **REDUCES MISSED AND MISUNDERSTOOD MESSAGES**—operators hear only messages within their own operation—minimizes confusion, inattention.
- **INCREASES OVERALL EFFICIENCY**—fewer errors mean more productive utilization of time—fewer repeat messages—more dispatched vehicles per hour...real advantages during peak load periods.
- **INCREASES AREA COVERAGE**—"coded squelch" circuit automatically maintains optimum receiver sensitivity, assuring maximum communications range at all times—prevents desensitization of the receiver by accidental or intentional misadjustment.
- **EASIER TO OPERATE**—no additional buttons, lights, adjustments or operational techniques—elimination of squelch adjustments makes PRIVATE-LINE even simpler to operate than conventional two-way radio equipment.
- **REDUCES OPERATOR FATIGUE**—elimination of "channel chatter" enables operator to concentrate on his job—reduces tension, providing a more pleasant atmosphere—increases job satisfaction.



MOTOROLA

COMMUNICATIONS & ELECTRONICS, INC.



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ELECTRICAL BUSINESS OUTLOOK

Electrical World
APRIL 22, 1957

Fuel—particularly coal—prices are becoming more worrisome to electric utilities. They've been edging up over the past few years and they took another jump this month as a result of last year's labor settlement in the coal industry. Importance of this is pointed up by recently released coal requirements for the year of 165 million tons—or more than a third of all domestic sales.

Chart at the bottom of the page tells part of the story. Fuel costs this year will eat up at least 16.7¢ out of each electric revenue dollar—up from 16.4¢ last year. This, combined with the leveling out of efficiency gains for steam stations, will continue to push up operating costs.

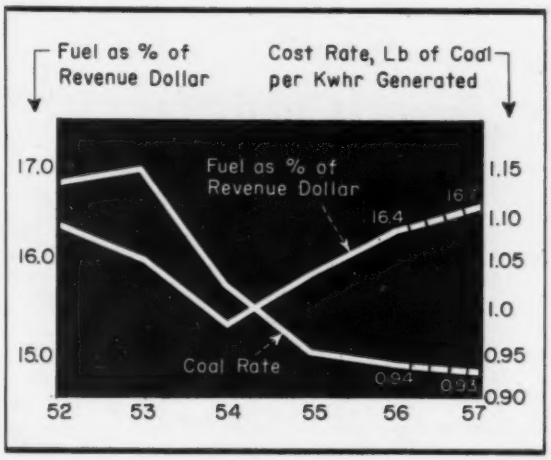
The pattern is already emerging. FPC's preliminary report for January indicates electric utility net income has dropped 2.1% from the same month last year while electric revenues climbed 6.2%. And the big jump in expenses was fuel—up a whopping 17% over January of last year. You get a longer term view from the utilities operating ratio figure (the relation between operating expenses and revenue). This ratio now seems likely to take a slight upturn this year after years of decline. This ratio leveled out last year to 44.4% and may very well edge up to 44.5% for the current year.

This raises the possibility of additional rate increases to relieve the pressure, particularly where fuel escalation is not provided for in schedules. A few utilities have already sought increases to protect their rate of return. They've explained that improved machine and organizational techniques just haven't been able to keep pace with rising costs.

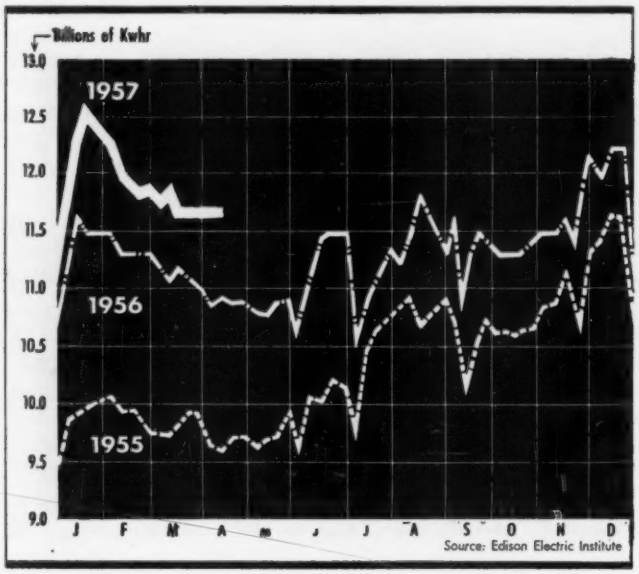
Meanwhile, business is getting a breather on some price fronts. Latest Bureau of Labor Statistics index of wholesale industrial prices stands at 125.4 (1947-49 = 100), a slight decline from last month's 125.5. Sharpest drops this year show up in quotations for basic raw materials. Prices on machinery and fabricated products are still inching up.

Drop in basic raw material prices is result of recent changes in demand picture. The Suez crisis last November touched off a rash of scare buying in some critical materials. The resulting sudden shortages shot prices up temporarily. Also, businessmen were building up inventory at a fairly rapid pace last year, and many firms have been drawing down their oversize stocks of materials.

IMPACT OF FUEL PRICES: A SOURCE OF WORRY



STATISTICS



OUTPUT
Week ended April 13, 11,695,000,000 Kwhr Up 7.1%

Per Cent Change From Previous Year

	Mar. 30	Apr. 6	Apr. 13
Total U. S.	+ 6.4	+ 7.8	+7.1
New Eng.	+ 3.9	+ 5.2	+5.2
Mid. Atlan.	+ 2.1	+ 6.1	+4.7
Cent. Ind.	+ 6.8	+ 9.1	+6.7
West Cent.	+ 8.7	+11.8	+9.5
Southeast	+ 7.8	+ 7.5	+7.4
South Cent.	+10.1	+ 9.9	+9.5
Rocky Mount.	+ 8.1	+ 7.1	+7.2
Pacific			
NW	+ 3.6	+ 4.2	+9.5
SW	+ 7.7	+ 7.7	+7.8

Seasonally Adjusted Index 231.4
Week Ago 231.3
Year Ago 215.8

Atomic Energy Commission requirements—1,150,000,000 Kwhr (Electrical World estimate). Excluding AEC, output increase was 7.7%.

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Feb.	121.33	121.20	115.59	5.0
Peak—Class 1 Systems. million kw	Jan.	104.0	102.8	95.8	8.6
Estimated Dec. '57 Peak	Jan.	113.7	114.5	113.3	0.4
Production—billion kwhr	Feb.	48.67	55.50	47.99	1.4
Hydro		9.98	10.19	10.63	−6.1
Fuel		38.69	45.31	37.36	3.6
Sales—billion kwhr	Jan.	49.15	47.46	46.32	6.1
Residential		14.44	13.22	13.45	7.4
Commercial		7.54	7.34	7.00	7.7
Industrial		24.68	24.44	23.60	4.6
Other		2.49	2.47	2.27	9.7
Fuel Consumption	Feb.				
Coal—million tons		13.21	15.98	13.44	−1.7
Oil—million barrels		6.96	9.90	7.10	−2.0
Gas—million cu ft		83.24	74.77	67.81	22.8
Net Income Class A & B Co's—million	Jan.	123.86	132.82	126.58	−2.1
Residential Customers—millions	12 mos.	45.71	45.62	44.41	2.9
Revenue per kwhr	ended	2.60¢	2.60¢	2.64¢	−1.5
Avg kwhr per customer	Dec. 31	2,969	2,942	2,751	7.9
Avg annual bill		$77.19	$76.86	$72.63	6.3

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	Feb.	146	146	143	2.1
ENR Construction Cost	April	148.7	148.6	143.2	3.8
BLS Cost-of-living	Feb.	118.7	118.2	114.6	3.6
New Orders for Machinery (1950 = 100)	Feb.	158	152	161	−1.9
NEMA Sales					
Insulation materials	Feb.	146	154	163	−10.4
Electric appliances		94	96	109	−13.8
Wholesale prices	Jan.				
Motors and generators		140.2	140.6	126.5	10.8
Transformers and regulators		146.6	146.6	131.2	11.7
Switchgear and fuses		164.4	163.9	147.5	11.5
GNP—annual rate—$ billion	4th Qtr.	423.8	413.8	397.3	6.7

MANAGEMENT BULLETIN

FINANCE

Only one new security offering was made by the electric industry last week. This was the 75,000 common shares of Iowa Southern Utilities Co offered publicly by the First Boston Corp group at $21.50 a share.

Mississippi Power Co bonds were half sold as EW was going to press. This is the report from Eastman Dillon, Union Securities & Co and Equitable Securities Corp group as it offered $6 million first mtge 4⅝% bonds (Moody's rating "A") due 1987 at 102.046% to yield 4.50%. Group had won them on a bid of 101.149%.

Southern Co rights offering successful. Company says that 96.1% of its 1,507,-304 common shares offered at $20 a share was subscribed for prior to the close of the subscription period. Remaining 3.9% was taken by the underwriting group headed by First Boston Corp.

New financing continues heavy. These companies are planning new security offerings: El Paso Electric Co, $6.5 million first mtg bonds, 20,000 preferred shares and 119,522 common shares; Interstate Power Co, $20 million first mtg bonds and $9 million common stock; Philadelphia Electric Co, a common stock offering on the basis of one new share for each 20 shares outstanding; Puget Sound Power & Light Co, $20 million first mtg bonds, and Tacoma, Wash., City Light, $5 million bond issue.

RATES

Cleveland's municipal electric rates raised. City's Department of Light & Power increases power rates for first time in plant's 50 year history. City Council approves boosts of 14% for residential, 20% for small commercial, and 7% for industrial and commercial users.

Central Maine Power Co appeals $2.3 million a year rate boost. Company decides to file a bill of exceptions with the Maine Supreme Court as an appeal from the recent rate decision of the Maine Public Utilities Commission against the company (EW, April 8, p 65).

Alabama Power Co puts in equalizing rates throughout the state. Company gets Alabama Public Service Commission to put in a minimum of 70¢ a month for all parts of the state for residential customers as compared with a minimum of 70¢ in Birmingham and surrounding area and 75¢ elsewhere in the company's service area in Alabama.

Southern California Edison Co asks for "escalator clause" in its rates. Testifying before the California Public Utilities Commission on its $34 million a year rate increase, Robert P. O'Brien, Edison vice president in charge of rates, proposes that when costs go up rates would automatically follow in a manner comparable with labor contracts which connect wages to cost-of-living variations. He said that with rates geared to rise as costs of wages, fuel, taxes, and other production expenses rose, there would be no need for frequent applications to PUC for rate changes.

LEGISLATION

Recent bills introduced in Congress. Sen John S. Cooper (R-Ky.) offers bill to provide a self-financing plan for Tennessee Valley Authority. It calls for a limit of $750 million on bonds that could be issued in the next five years . . . Rep Harris (D-Ark.) introduces bill H. R. 5824 to amend the Federal Power Act to provide that the depreciation allowance for electric utility companies for rate-making purposes be the same with those used by such companies in computing federal income taxes.

A California state constitutional amendment to place municipal utility districts under the state PUC has been proposed. . . . A bill to establish a $10,000 a

year office of "people's public service counsel" to argue against requests for utility rate and fare increases before the state PSC has been introduced in the Wisconsin legislature . . . Delaware public utilities will be forbidden to reduce or abandon any of their services without Public Service Commission consent under provisions of a bill introduced in the House recently.

A 25% increase in state taxes against natural gas, electricity and telephones has been enacted by the Montana legislature.

ACQUISITION

Private company takes over municipal electric operations. Town of Redfield, Ia., voted 266 to 137 to sell its municipally-owned electric distribution system to the Iowa Electric Light & Power Co. Company was given a 25-year franchise. Town was faced with a major rebuilding project which would have required a 25% increase in rates, the company said.

EMPLOYEE RELATIONS

A 5% pay raise was agreed upon between the Arizona Public Service Co and IBEW and Laborers District Council unions. Company also gave a similar increase to its 1,300 non-union employees.

Another wage settlement. IBEW and Dallas Power & Light Co labor contract is ratified. Some 470 electrical workers of the company agree to accept a 4.7% wage increase.

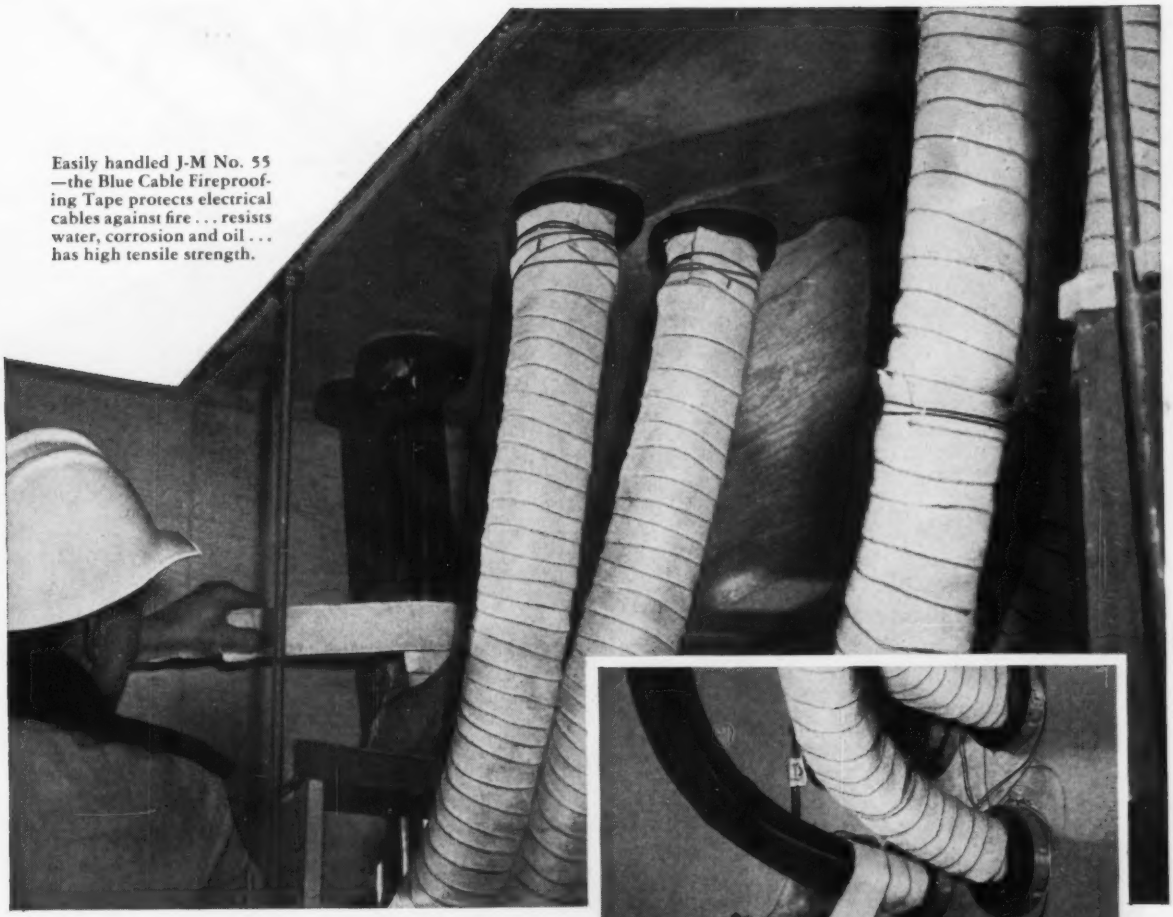
CONSTRUCTION

Texas Utilities Co will spend $79 million this year, a total of $267 million during the years 1957-59 for plant addition. The program calls for the addition of 908,000 kw of new generating capacity of which 125,000 kw will be placed in operation this year. . . . The Seattle, Wash., City Council is considering expansion of its Diablo power plant on the Skagit River by 25,000 to 30,000 kw at a cost of $1.1 million. . . . Utah Power & Light Co acquires 100 acres of land for a plant site and another 200 for transmission lines. . . . Oklahoma Gas & Electric Co begins work this spring on a 236,000-kw unit addition at its Mustang Station. The new unit is scheduled to come on the line in 1959. Overall, OG&E expects to spend $30 million this year on plant expansion.

PUBLIC RELATIONS

A clever gimmick! Just before mailing its annual report Arizona Public Service Co sent out a 9x4 in. card which depicted an Indian lady weaving a 5¼x2½ in. Navajo rug which can be removed for use as a bookmark. This idea was used on the colorful front cover of the annual report. Printed in rotogravure, the back cover also in color boasts Arizona's climate, elbow room for growth, ample labor supply and proximity to industrial markets. A coupon on the page requests firms interested in an Arizona location to write the company's Area Development Department for further details.

Annual reports come at fast clip. Some of the outstanding features of these latest reports received are: A colorful map of Alabama Power Co's area served; a table of operating statistics of Carolina Power & Light Co showing the first full calendar of operations of present company in 1926 as compared with 1936, 1946, 1951, 1955, and 1956; a front cover picture in color of Central Vermont Public Service Corp just after a snow storm; an interesting column "Looking to the Future" of Central Power & Light Co; a page of employee activities by both the Community Public Service Co and El Paso Electric Co; a number of colorful charts on Florida Power & Light Co's progress in the state's forward surge; a front cover with a chart depicting cost of living, residential cost of electricity and gas, and the purchasing power of the dollar of the Housatonic Public Service Co, and an excellent offset varitype job on colored stock by the Minnkota Power Cooperative, Grand Forks, N. D.



Easily handled J-M No. 55 —the Blue Cable Fireproofing Tape protects electrical cables against fire . . . resists water, corrosion and oil . . . has high tensile strength.

Photos courtesy of Lone Star Cement Co., Dallas, Texas

ELECTRICAL CABLES . . .

Fireproofed quickly . . . to last!

with J-M No. 55 Asbestos Cable Fireproofing Tape

Here is the effective, time-saving fireproofing for electrical cables . . . designed for lasting protection.

Made of asbestos, Johns-Manville No. 55 Cable Fireproofing Tape offers many outstanding advantages. It will not support combustion; repels water, resists flame, fungus, mold, corrosion and oil. Explosive or toxic gases will not develop under arc. High tensile strength is maintained even after burnout.

In addition, No. 55—the Blue Cable Fireproofing Tape is impregnated with a silicone material that provides low water absorption and high moisture repellence. Thus, damage from ground water, flooding, fog or humidity is minimized. Selvedged edges prevent threads from pulling out and weakening the tape. There are no ragged, unimpregnated edges through which ground water can penetrate.

J-M No. 55 Cable Fireproofing Tape is simple to apply, even in confined spaces. It won't droop, sag, or unravel . . . assures a tight, lasting wrap. Furnished in widths from 1″ to 3″ in 25- or 100-foot rolls, it is easy to handle and stock.

For complete information on J-M No. 55 Cable Fireproofing Tape, write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

Johns-Manville ASBESTOS TEXTILES

JOHNS-MANVILLE JM PRODUCTS

"Each and every component good as new ... after four years' continuous service,"

reports Pennsylvania Electric Company

"After four years' service—and more than double the operations of a normal between-inspections period—every component was like new in this Westinghouse URS regulator," states Mr. Frank Bartlett, Jr., maintenance foreman of Pennsylvania Electric Company.

Experiences like this back up 20-year contact-life warranty on URS regulators

"When we opened this Westinghouse URS voltage regulator after four years' continuous service, we found each and every component as good as new," states the maintenance foreman at Pennsylvania Electric's Sayre-Waverly Substation. "Contacts still in perfect operating condition.

"With as many as 100 operations per day," he continues, "this equipment delivered continuous trouble-free service. The Westinghouse URS regulator eliminated the constant adjustments, necessary to prevent drifting, which were required for the regulators we formerly used. Maintenance is extremely low."

He adds, "Complete dependability under constant service, long, trouble-free life, ease of adjustment, and stability in delivering constant voltage make the URS regulator a major factor in guaranteeing customer satisfaction.

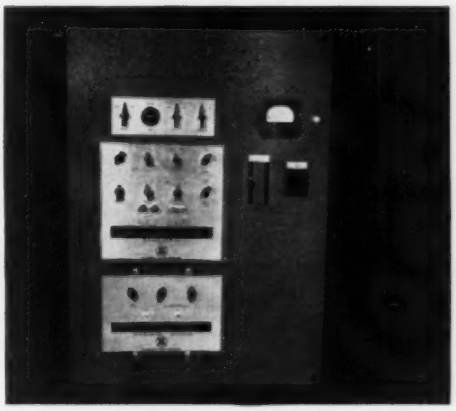
"The 'inside story' revealed when we inspected the unit, gives us complete confidence that this regulator will perform its exacting job . . . for a long time to come."

And now . . . a new concept in precise voltage regulation . . . the URS regulator is equipped with Magamp® (magnetic amplifier) control. Standard for URS and URT load tap-changing equipment for both station step regulators and power transformers. Magamp has no moving parts, no need for mechanical adjustments, no maintenance. All settings—band width, balance voltage, line-drop compensation—are made electrically. This is one of the features assuring still longer life of URS regulators, better voltage regulation.

For all the facts concerning URS voltage regulators, call your Westinghouse representative . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70807

YOU CAN BE SURE... IF IT'S Westinghouse

In this recent announcement, Westinghouse offers a 20-year prorated warranty on contact life for URS regulators with inspection of contacts extended to 10-year intervals.



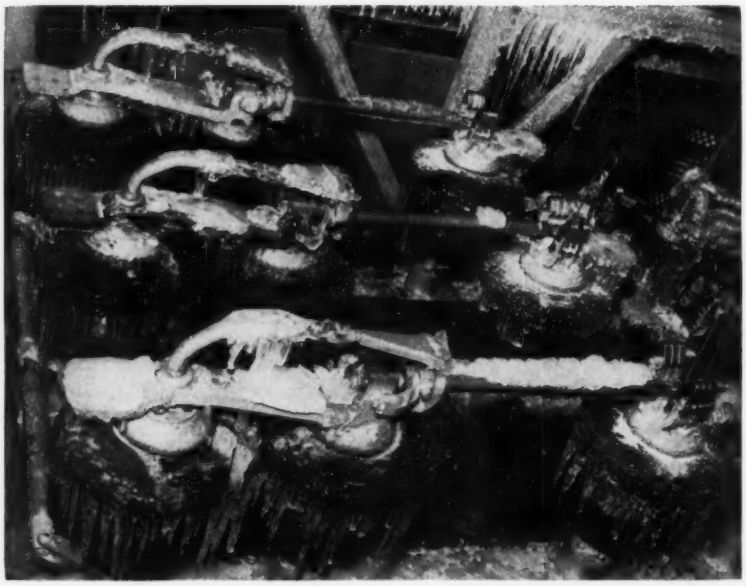
Behind this control panel are the economy of maintenance-free Magamp and the unmatched speed and smoothness of Geneva gear tap changing—exclusive with URS and URT voltage regulators.

Disconnect Switches

. . . of outdoor type, through 330-kv, clear 0.75 in. ice from contact structures

A new line of outdoor disconnecting switches manufactured by General Electric's High Voltage Switchgear Department at Philadelphia has successfully undergone a series of severe ice and short-circuit tests, according to the company.

In cold room tests at Pennsylvania State University's College of Engineering and Architecture, RF-2 disconnecting switches rated through 330 kv demonstrated complete ice-breaking action. The tests were conducted on switches pre-set in both open and closed positions. Water was sprayed on the pole units until the room temperature dropped to 25 F. After the equipment had set for approximately 11 hr, the switches were operated and proved capable of clearing a minimum of 0.75 in. of ice from contact structures (see picture at right).



The redesigned line of switches feature new, inverted "U" shaped spring pressure contacts which increase pressure on the switch blade during momentary flow.

Moving parts and stationary contacts are heavily surfaced with high density silver plating to increase resistance to wear. The switches surpassed NEMA requirements.

Westinghouse Ups Price of Dry Type Transformers

A price increase of about 11% on the complete line of dry type distribution transformers, 3-300 kva, is effective April 22, advises Westinghouse Electric Corp.

"The price increase became necessary" said Gordon C. Hurlbert, manager of the company's Distribution Transformer Dept., "as a result of continued increase in labor and material costs, and also because of demands by the construction industry for an improved dry type transformer having lower sound levels and a thermal overload capacity".

TVA Contracts Awarded

These manufacturers have been awarded contracts for electrical and other equipment by Tennessee Valley Authority:

Moloney Electric Co, transformers, $56,072; Reynolds Metals Co, cable, $57,557; Westinghouse Electric Corp, oil circuit breakers, $464,000; General Electric Co, diesel-electric locomotive, $85,876; Blaw-Knox Co, principal piping systems and appurtenances, Johnsville steam plant, estimated total, $3,330,000; Chain Belt Co, traveling water screens, $107,659; and Birmingham Tank Co, steel stacks, $274,007.

Merger Plan Disclosed by Elliott Co, Carrier Corp

Elliott Co, manufacturer of motors, turbines, and heat transfer equipment, and Carrier Corp, producer of air conditioning equipment, have plans to merge Elliott into Carrier, according to a joint statement by William A. Elliott, president of Elliott Co, and Claud Wampler, chairman of Carrier Corp.

The merger agreement will be submitted to the stockholders of both companies at special meetings. The proposal calls for an exchange of stock. Holders of Elliott common stock would receive 0.65 share of Carrier common. And holders of Elliott 5% cumulative preferred stock would receive 1.2 shares of Carrier 4½% preferred.

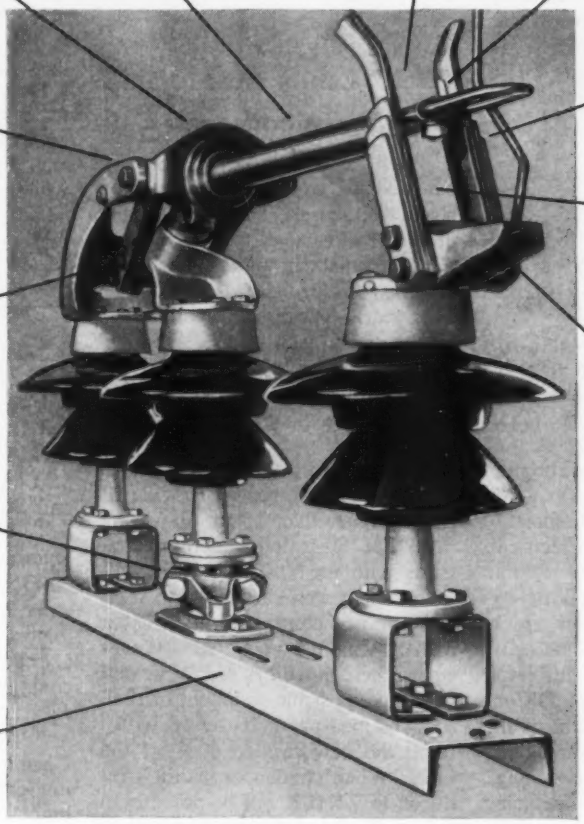
The executives said that when the merger becomes effective, Elliott will continue under its present management as a division of Carrier. Elliott headquarters are at Jeanette, Pa., and Carrier, a large user of Elliotts' products, has executive offices at Syracuse, N. Y.

U. S. Aluminum Production

Primary aluminum production in the U. S. for February amounted to 119,064 tons, according to the Aluminum Association, New York. This tonnage is a decrease of 28,964 tons from 147,030 tons in

(*Continued on page* 104)

This unmatched combination of features proves it . . .


Exceptionally high contact pressure—provides maximum current-carrying capacity—cleans during operation.
Fully controlled blade in all positions.
Large contact deflection — maintains high-pressure contact over long life.
Corrosion and abrasion-resisting silver-to-copper contacts for high conductivity.
Simplified, rugged factory-sealed ball bearing blade-actuating mechanism for smooth operation. Blade is locked in open and closed position.
Independent pressure-applying spring and current-carrying members in contacts. No small contact springs. No dual function parts.
Contacts fully visible for thorough inspection.
Minimum number of moving parts — for efficient, easy, dependable operation.
Minimum number of current interchanges — for maximum electrical efficiency.
Permanently sealed rotating insulator bearing — prevents moisture, dirt accumulation. Ease of operation assured.
Sturdiest possible construction — built to outperform and outlast other switches.

For ultimate low cost, you can't beat Delta-Star MK-40 Switches

The sum of components produces an *unequalled* air switch . . . because, considering all features, the Delta-Star MK-40 stands out for its highly efficient, long, dependable service at low ultimate cost.

Other switches may look like the Delta-Star MK-40, but they do not necessarily perform the same. In such other switches, even minor changes in bearing centers, or an extra link in the mechanism only introduce needless complications and small parts that may detract from top performance.

For your consistently best buy in air switches, specify the Delta-Star MK-40. *Delta-Star Electric Division, H. K. Porter Company, Inc., Chicago 12, Illinois. District offices in principal cities.*

HKP DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.

Divisions of H. K. Porter Company, Inc. are: Connors Steel, Delta-Star Electric, Henry Disston, Laclede-Christy, Leschen Wire Rope, McLain Fire Brick, Quaker Rubber, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings.

U. S. Aluminum Production

(*Continued from page* 102)

January. Also the February production is a decrease of 13,698 tons from 132,762 tons in February, 1956. Total aluminum production for the first two months in 1957 amounted to 266,094 tons. This was a decrease of 7,062 tons from 273,156 tons for the same 1956 period.

Olin Mathieson Buys Southern Electrical Assets

Olin Mathieson Chemical Corp, New York, has completed negotiations for the purchase of the assets of Southern Electrical Corp, Chattanooga, Tenn., a manufacturer of aluminum wire and cable. The purchase was approved April 2 by Southern Electrical stockholders.

Assets of Southern Electrical, which has an annual sales volume of about $15 million, will be exchanged for Olin Mathieson stock.

Southern Electrical will be operated as a part of Olin Mathieson Aluminum Div. Walter F. O'Connell, executive vice president of the Aluminum Div., stated that there would be no changes in personnel, agents, distributors, manufacturing or sales policies.

S&C Markets Products by Western Sales Division

The newly formed Western Sales Division of S&C Electric Co is in full operation, advises R. W. Hutchinson, manager. Headquartered at 2525 El Camino Real, Redwood City, Cal., the Western Sales Division has established warehouse stock, and is staffed for sales service in the field and for application engineering at headquarters, added Hutchinson. The Western Sales Division will serve the nine western states, plus the Hawaiian Islands and Alaska.

S&C's Western Sales Division, along with its counterpart the Eastern and Central Sales Divisions, reportedly represents a new idea in electrical apparatus sales. Rather than operating as a conventional district office, each S&C Sales Division is a completely autonomous operation with full control of all phases of its sales operations.

"Well" Center Cars to Ship Large A-C Condensers

"Well" center railroad cars will be used to expedite shipment of large condensers now being required by various power plants. Allis-Chalmers is putting into operation two specially designed cars this year. These cars will carry 50-ton loads each and pieces considerably larger than existing cars it is reported.

Effective well opening in the car will be 9.5 ft wide between the top of the rail and points 15 in. above the rail. It will be 10 ft wide at points higher than 15 in. above the rail. The 30-ft long opening contrasts with the 7.5 by 30-35 ft dimensions of well cars now in use.

Clearance conditions in the area of Allis-Chalmers West Allis Works where the condensers are fabricated will make possible shipment of shell sections measuring 10 by 18 by 30 ft on the new cars to 40% of the U. S. When condenser width is reduced to 9.5 ft it will be possible to ship to 70% of the country and to 80% of the country where the width is 8.5 ft. Local clearances in the Southwest make it possible to ship larger pieces to that section of the U. S. than to the Eastern region of the country.

Delta-Star's Powerupter Applied to Indoor Switches

A number of Powerupters are now applied to indoor disconnect switches according to information from Delta-Star Electric Division of H. K. Porter Co, Inc. This switch protective device is designed for mounting on all indoor and outdoor disconnect switches made by the company (EW, Nov. 5, 1956, p 56).

When a number of switch cubicles was shipped to an Eastern utility for substation service, the Powerupter was mounted on Type J-14 indoor group-operated switches. There were 54 of the single-pole switches, 9 being mounted inside each metal cubicle.

Each of these two-insulator switches is mounted vertically, and has a double flat-bar blade hinged at the bottom. A Powerupter is mounted above the upper contacts of each disconnect switch in a tilted position. The operating mechanism consists of a common shaft joining each three-unit group of switches, insulating links and operating lever.

M & M BRIEFS

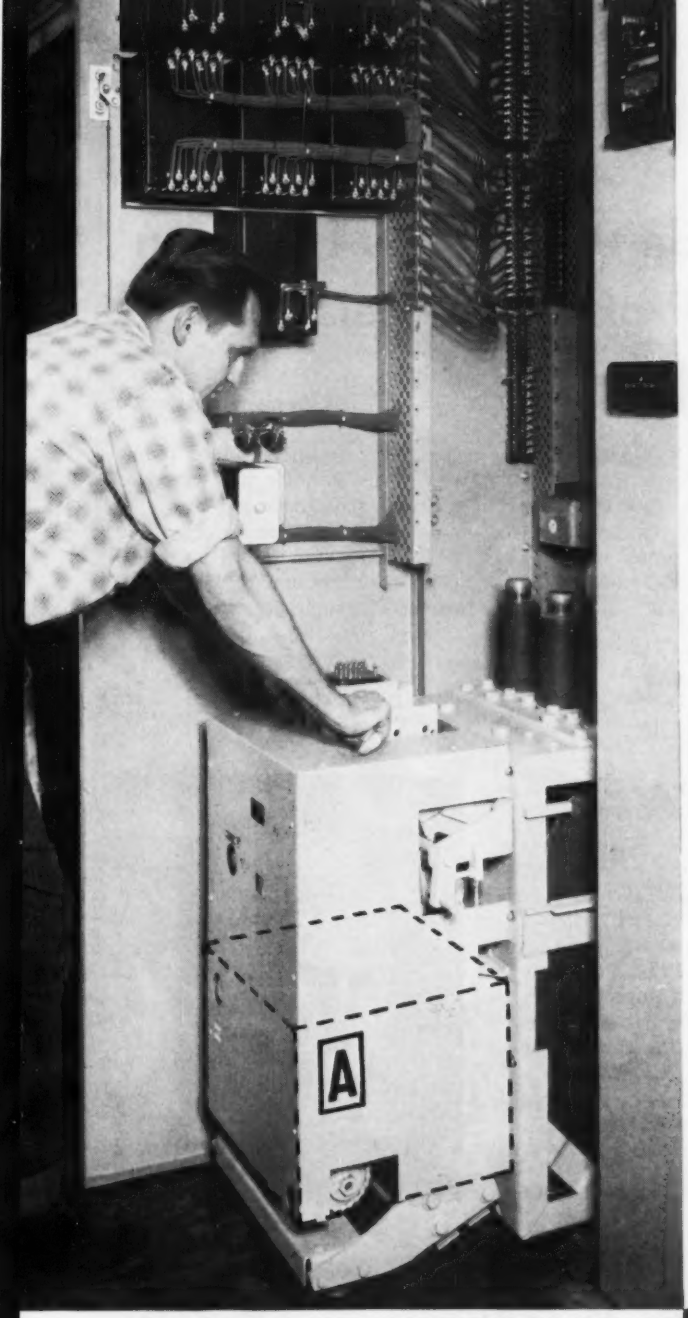
A. B. Chance Co will add more than 87,000 sq ft of manufacturing area to its Centralia, Mo., plant. Target date for completion is October. Then assembly operations at St. Louis will be moved to Centralia and St. Louis plant will be closed.

Square D Co's new $3 million plant on Good Hope Rd, Glendale, Wis., is reported to be operating on a minor production basis. Started about a year ago, the building when completed will have about 180,000 sq ft of floor area.

Glastic Corp, Cleveland, is supplying glass reinforced coil clamping blocks to give a greater safety margin for short circuit ratings in a line of distribution transformers manufactured by Allis-Chalmers.

Riley Stoker Corp, Worcester, Mass., is furnishing six Duplex pulverizers to supply fuel to the 2 million lb per hr steam boiler at Detroit Edison's River Rouge plant. The six units are designed to deliver a total of 138 tons of pulverized coal per hr, sufficient for the 114.5 tons per hr to be required by the boiler.

NEMA—National Electrical Manufacturers Association, New York, has formed an informational committee to keep industry and the public posted on new developments in the field of semiconductors. These materials include germanium, silicon, selenium, copper oxide, and magnesium copper sulphide. They have been used as the basis for recent developments in rectifiers, diodes, and transistors.



A 90% cut in control power for Metal-Clad Switchgear

A stored energy closing mechanism, latest of the engineering and design developments which make General Electric your most modern metal-clad switchgear buy, now offers you a 90% reduction in control power requirement. Magne-blast circuit breakers with interrupting ratings of 150 MVA or over are optionally available with this mechanism.

Here's what this feature can do for you:

1. Eliminates requirement for 125 volt or 250 volt metal-clad operating battery.
2. Simplifies control power distribution system.
3. No high current voltage drop problems.
4. Permits simultaneous closing of any number of breakers without the high current problem.
5. Omission of AC closing rectifier eliminates associated maintenance and operating problems.
6. Built-in feature provides for safer, faster, manual emergency closing in event of loss of control power.

For additional information on this optional feature, write to Section 511-25, General Electric Company, Schenectady 5, New York.

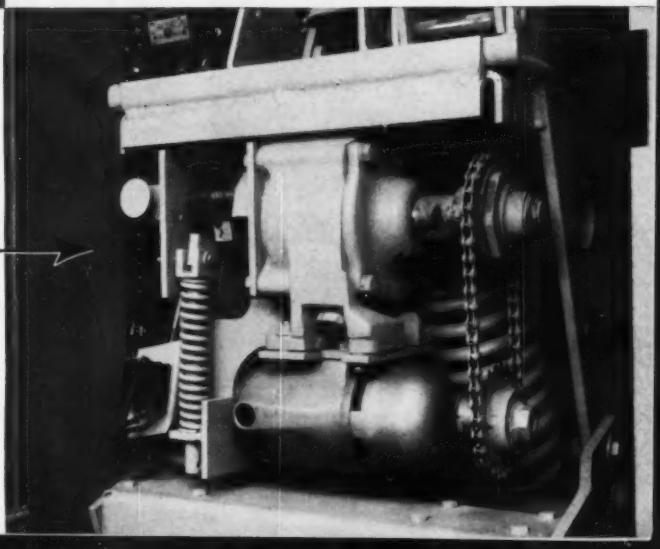
Progress Is Our Most Important Product

GENERAL ELECTRIC

IN ADDITION to the optional stored energy closing mechanism, General Electric Metal-clad Switchgear and Magne-blast breakers offer all the PLUS values of solenoid-operated equipment, such as Self-X insulation, and easy maintenance.

A

ENERGY IS STORED in powerful springs. To close a breaker, it is necessary to energize only a low-energy release coil with the control switch and the springs do the rest. The springs are recharged by a fractional horsepower gear-motor in a few seconds.



Florida Power Ups Flanagan to VP of Public Relations

Florida Power Corp has announced the recent election of J. K. (Pat) Flanagan to the position of vice president in charge of public relations.

In his new capacity, Flanagan will head up an expanded public relations program for the St. Petersburg utility. He has served as director of advertising and publicity for the past 15 years.

A member of the Public Relations Society of America, Flanagan is active in public relations and utility circles. In recent years, his "In The World" column has appeared regularly in the "Unconventional Daily" at Edison Electric Institute's annual convention.

J. K. FLANAGAN

Price to Head Eugene W&E

Byron Price, former assistant administrator of Bonneville Power Administration, will become general superintendent and secretary of the Eugene (Ore.) Water & Electric Board July 1. He will replace Ray Boals, superintendent since 1946, who is retiring.

Prior to his appointment to the BPA post in June, 1954, Price was chief administrative aid to Boals. While associated with Eugene W&E, Oregon's largest municipal electric system, Price worked in connection with the Eugene system's power supply proposals linked to the Cougar Dam partnership plan and others.

Price, before his first association with Eugene, served with the Corps of Engineers Portland district office from October, 1941, to June, 1953. He is a lieutenant colonel in the Corps of Engineers reserve.

BYRON PRICE

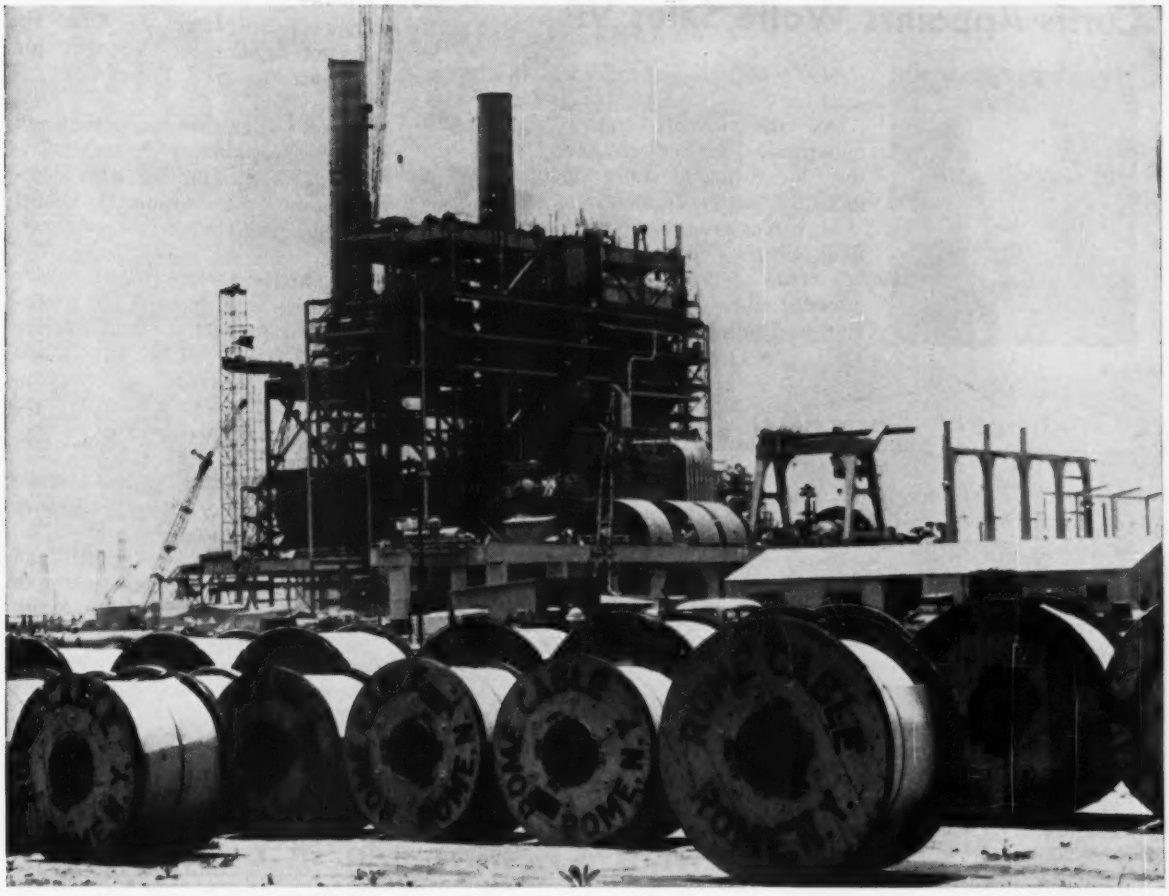
Stouffer Is Named to VP Post

F. E. Stouffer has joined McGraw-Edison Co as vice president and plant manager of the Pennsylvania Transformer Division. He will be responsible for the company's plant operations in Canonsburg, Pa. Sales will continue under the direction of W. R. Swoish, vice president and sales manager.

Until his present appointment, Stouffer served for seven years as manager of the Canonsburg plant of Radio Corp of America, with which he had been associated since 1935.

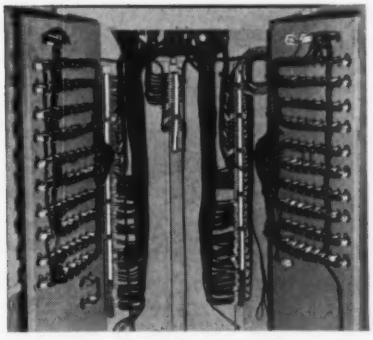
A graduate of Northwestern University's School of Commerce in Advanced Management, Stouffer also studied advanced electronics at the University of Pennsylvania.

F. E. STOUFFER



Southern California Edison installed . . .

¼ million feet of Rome control cable in new Alamitos steam station



EASY TO HANDLE, STRIP, SPLICE. The clean, low-friction surface of Rome's control cables enabled Alamitos workmen to pull the cable through conduits and into this cabinet quickly and easily.

For its station control circuits, this large West Coast utility selected high-quality Rozone-Roprene control cable —*253,000* feet of it. This Rome cable is a logical choice for any such permanent installation since it represents the ultimate in control cable design and performance.

Built to last. Each conductor is insulated with a premium-quality, oil-base insulating compound—Rozone—which provides excellent protection against corona and ozone cutting. Rozone is also highly resistant to water and aging. Each individual conductor is then covered with a tight-fitting color-coded Roprene (neoprene) sheath.

Over-all protection is provided by a Roprene jacket, which not only resists weather, oils, chemicals, and even flame, but also provides a high resistance to mechanical injury during and after installation. And this tough Rome Cable material is virtually immune to corrosion and electrolysis.

If you want the very best in station control cable for your next job, specify Rozone-Roprene. Contact your nearest Rome Cable representative for more information—or write to Department 803, Rome Cable Corporation, Rome, New York.

ROME CABLE

CORPORATION

Curtis Appoints Wolfe Sales VP

Newly elected vice president in charge of sales for Curtis Lighting, Inc, is C. E. Wolfe.

As sales vice president, Wolfe will direct nationwide sales and marketing activities for the Chicago manufacturer of commercial and industrial lighting equipment.

He comes to his new post from Liquid Carbonic Corp's Carbon Dioxide Division, where he served as general sales manager. Wolfe attended the University of Maryland and Rutgers University.

PERSONAL BRIEFS

George W. O'Connor, head of O'Connor Construction Co, joins Montana Power Co as executive assistant. New division managers at Great Falls and Helene are **H. K. Dickinson** and **Dix C. Shevalier,** respectively.

Emory P. Bailey, former manager of Weymouth Light & Power Co, a New England Electric System subsidiary, has assumed an executive post with Yankee Atomic Electric Co. **William N. Flynt** succeeds Bailey.

Puget Sound Power & Light Co has named **A. B. Couch** residential-sales director of general-sales and commercial departments.

Pacific Power & Light Co has named **Jesse D. Frantz** superintendent of the electric underground and steam heat department; **A. J. Cardelli** general foreman of underground electric distribution, downtown area; **Carl N. Burgard** general foreman for steam heat; and **Clyde St. Clair** to handle construction engineering for both departments.

NEMA Unit Honors Winning Co-ops

Charles L. Overman (left) and Harvey Bly (right) receive plaques and $150 second and $250 first awards, respectively, in the REA Cooperative Division of the First National Rural Home Electrical Load Building Contest from Contest Chairman J. R. Cobb. Overman is agricultural engineer, Blue Ridge Electric Membership Corp, and Bly is board president, Sioux Valley Empire Electric Assn.

The contest was sponsored by the Competitive Fuels Subcommittee, National Electrical Manufactuers Assn.

Charles B. Beverage is new senior engineer and **James E. Ames III** district engineer at Hampton, for Virginia Electric & Power Co.

Detroit Edison Co's **James M. Knox** has been appointed electrical division engineer of the design engineering department. **Arnold H. Giebel** becomes assistant division engineer.

J. J. McKenna has retired as vice president and treasurer of Louisville Gas & Electric Co . . . Jersey Central Power & Light Co's **Clyde A. Mullen** has retired as vice president. His duties have been assumed by **William H. McElwain.**

At Hydro-Electric Power Commission of Ontario, **Henry J. Sissons** was made assistant general manager of new services branch and **H. P. Cadario,** assistant director of engineering . . . **Havilland L. Smith** succeeds retiring **H. M. McCullough** as internal auditor of Shawinigan Water & Power Co.

Recent Federal Power Commission appointments include: **Ralph F. Gates,** to deputy chief accountant; **Paul J. Arrington** to chief of division of accounts in the office of the chief accountant; and **Howard E. Wahrenbrock** to solicitor, in the office of general counsel.

Charles E. Wilson, former president of General Electric Co, has accepted chairmanship of Manhattan College Council on Engineering Affairs.

James M. Trotter, vice president of engineering Royal Electric Manufacturing Co, has resigned to become president of the Mechanical Service & Engineering Co . . . **Robert H. Barclay,** former vice president-engineering at J. G. White Engineering Corp, is now practicing as a consulting engineer.

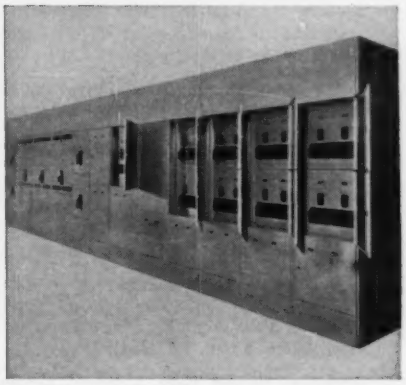
OBITUARY

Julius Hall, Jr, 69, retired commercial manager of Appalachian Electric Power Co died in Bluefield, W. Va., after a heart attack.

Karl Koerper, 56, a vice president of Kansas City Power & Light Co, died suddenly in his Kansas City home.

MOLDED CASE CIRCUIT BREAKERS

I-T-E plug-in mounted "Cordon" Circuit Breakers represent the maximum in flexibility, economy and safety.

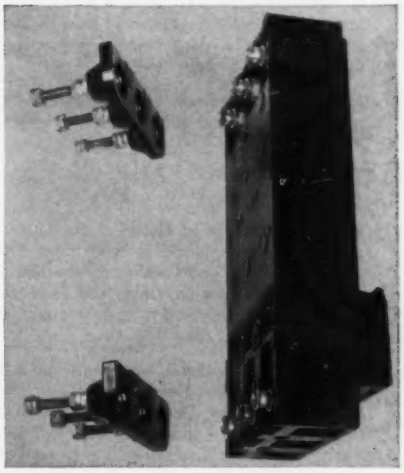


Typical switchboard installation of "Cordon" Circuit Breakers and large air circuit breakers.

I-T-E Plug-In Mounted "Cordon" Circuit Breakers Have Saved Countless Man-Hours

Plug-in mounting in switchboards provides features and advantages you get only in this modern, streamlined construction. Consider the ease of installation, the time saved in assembling switchboards. Consider the flexibility in meeting changing circuit conditions, the advantage of being able to change breakers without disturbing terminal connections. Consider, too, the added safety of concealed terminals with no live parts exposed. When you do, you'll specify switchboards with this time-proved method of installing molded case circuit breakers.

I-T-E plug-in molded case circuit breakers are available in ratings from 15 to 600 amp, up to 600 volts a-c, 250 volts d-c. Contact your I-T-E representative or leading independent switchboard manufacturers for details. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.



Used for many years in marine switchgear and approved by Underwriters' Laboratories Inc., I-T-E plug-in mounted circuit breakers require only two compact mounting blocks for switchboard installation.

I-T-E CIRCUIT BREAKER COMPANY

Small Air Circuit Breaker Division

In Canada, Eastern Power Devices Ltd.

MEETINGS CALENDAR

APRIL

American Institute of Electrical Engineers—Third Biennial Conference on Electric Heating, sponsored jointly by AIEE and the Toledo section of AIEE, Commodore Perry Hotel, Toledo, Ohio, April 23-24.

Northwest Public Power Association—Engineering and Operations Section, Tacoma Utility Center and Winthrop Hotel, Tacoma, Wash., April 23-24.

Lead Industries Association—Annual Meeting sponsored jointly with the American Zinc Institute, Drake Hotel, Chicago, Ill., April 24-25.

National Industrial Research Conference—Sponsored by Armour Research Foundation of Illinois Institute of Technology, Conrad Hilton Hotel, Chicago, Ill., April 24-25.

Pacific Coast Electrical Association—Administrative Services Section, Hotel La Playa, Carmel, Calif., April 24-25.

Association of Edison Illuminating Companies and Edison Electric Institute—Meter and Service Committee, Soreno Hotel, St. Petersburg, Fla., April 24-26.

Edison Electric Institute—Meter and Service Committee, Soreno Hotel, St. Petersburg, Fla., April 24-26; Purchasing and Stores Committee's Executive Committee and 10th Annual Meeting, Penn Sheraton Hotel, Pittsburgh, Pa., April 28-May 1; Insurance Committee, Williamsburg Inn, Williamsburg, Va., April 29-30; Accident Prevention Committee, Algiers Hotel, Miami Beach, Fla., April 29-May 1.

Northwest Electric Light & Power Association—Engineering and Operating Section, Sun Valley, Idaho, April 24-26.

American Power Dispatchers Association, Inc—National Spring Meeting, Los Angeles, Calif., April 26-27.

Institute of Radio Engineers—Eleventh Annual Technical Conference on Television, Cincinnati Engineering Society Bldg., Cincinnati, Ohio, April 26-27.

Association of Iron & Steel Engineers—Annual Spring Conference, Netherland Hilton Hotel, Cincinnati, Ohio, April 29-May 1.

MAY

American Institute of Electrical Engineers—Northeastern District Meeting, Wendell-Sherwood Hotel, Pittsfield, Mass., May 1-3; East Central and Middle Eastern District Meeting, Dayton-Biltmore Hotel, Dayton, Ohio, May 7; Protective Relaying Conference, Hightower Auditorium, Georgia Institute of Technology, Atlanta, Ga., May 9-10.

Edison Electric Institute—Transmission and Distribution Committee, Muehlebach Hotel, Kansas City, Mo., May 2-3; Prime Movers Committee, Tides Hotel, St. Petersburg, Fla., May 6-8; Hydraulic Power Committee, Highland Hotel, Massena, New York, May 13-15; Industrial Relations Committee, EEI Headquarters, New York City, May 16; Electrical System and Equipment Committee, Statler Hotel, Buffalo, N. Y., May 20-21; Accounting Division Time and Place Committee jointly with AGA, AGA Headquarters, New York City, May 23; Financing and Investor Relations Committee, Edgewater Beach Hotel, Chicago, Ill., May 31-June 1.

Southeastern Electric Exchange—Engineering & Operations Sections, Fontainbleau Hotel, Miami Beach, May 2-3; Heat Pump Steering Committee, sponsored jointly with Association of Edison Illuminating Companies and Edison Electric Institute, Battle House, Mobile, Ala., May 10-11.

Pennsylvania Electric Association—Hydraulic Power Committee, Skytop Lodge, Skytop, Pa., May 2-3; Communications Committee, Hotel St. Francis, Canton, Ohio, May 6-7; Eighth Annual Customer Relations Conference, Hotel Hershey, Hershey, Pa., May 8; Electrical Equipment Committee, Hotel Roosevelt, Pittsburgh, Pa., May 9-10; Relay Committee, Bedford Springs Hotel, Bedford Springs, Pa., May 16-17; Systems Operation Committee, Skytop Lodge, Skytop, Pa., May 23-24.

Air Conditioning and Refrigeration Institute—Annual Meeting, The Homestead, Hot Springs, Va., May 5-8.

Northwest Electric Light & Power Association—Business Development Section, Vancouver, B. C., May 6-8.

Appliance Parts Jobbers Association, Inc—18th Annual Meeting, Balmoral Hotel, Miami Beach, Fla., May 7-11.

Electric Companies Advertising Program—Copy Group Meeting, Hotel Statler, Cleveland, Ohio, May 8.

Public Utilities Advertising Association—Annual Convention, Hotel Statler, Cleveland, Ohio, May 8-10.

Industrial Nuclear Technology Conference—Museum of Science and Industry, Chicago, Ill., May 14-16.

Pacific Coast Electrical Association—Annual Convention, Fairmont Hotel, San Francisco, Calif., May 15-17.

New York State Society of Professional Engineers—1957 Engineering Industries Exposition in connection with its annual convention, Statler Hotel, New York City, May 16-18.

American Institute of Mining, Metallurgical and Petroleum Engineers—Eleventh Annual New England Regional Conference, Hotel Statler, Boston, Mass., May 17-18.

National Association of Electrical Distributors—49th Annual Convention, Sheraton Park and Shoreham Hotels, Washington, D. C., May 26-29.

JUNE

Electrical Companies Advertising Program—Management Group, Palmer House, Chicago, Ill., June 2.

American Society of Refrigerating Engineers—53rd Annual Meeting, Hotel Fontainbleau, Miami Beach, Fla., June 3-5.

Edison Electric Institute—Annual Convention, Palmer House, Chicago, Ill., June 3-5.

American Institute of Electrical Engineers—Industrial Power Rectifiers and Semiconductor-Metallic Rectifiers Committees, Morrison Hotel, Chicago, Ill., June 4-5; Summer General Meeting, Sheraton Mount Royal Hotel, Montreal, Quebec, June 24-28.

American Society of Mechanical Engineers—Semi-annual Meeting, Sheraton-Palace Hotel, San Francisco, Calif., June 9-13.

Public Utilities Association of the Virginias—Accident Prevention Conference, Daniel Boone Hotel, Charleston, W. Va., June 14.

American Society for Testing Materials—Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 16-21.

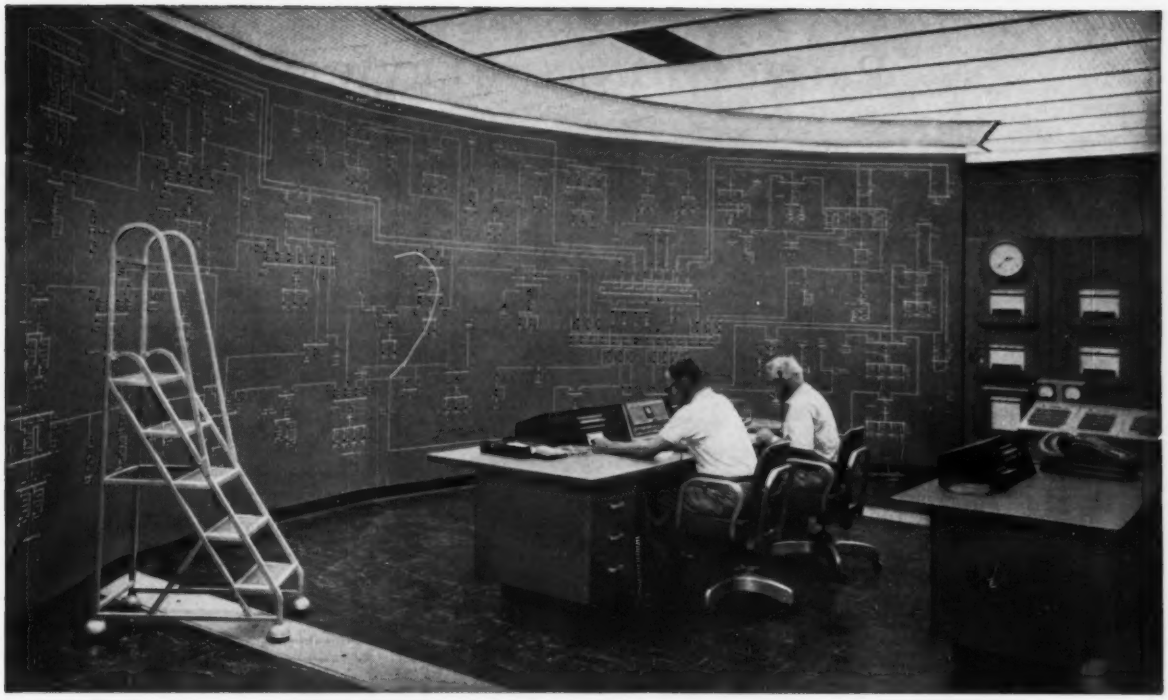
• **Wisconsin Utilities Association**—Accounting Section, King's Gateway Hotel, Land o' Lakes, Wis., June 23-25.

• **Michigan Electric Association**—Grand Hotel, Mackinac Island, Mich., June 23-26.

• Additions this week.

R/W Meeting Slated for Electric Companies

The first national gathering of electric company right-of-way men is scheduled for May 15 at Chicago, Ill. Problems and practices in acquiring sites and rights of way will be discussed at the one-day session. The meeting will be held in the Conrad Hilton Hotel. For details write R/W Editor, Electrical World, 330 West 42nd St., New York 36, N. Y.



New Jersey Power and Light Reports

GENERAL ELECTRIC PROGRESS LINE TWO-WAY RADIO PROVIDES MAXIMUM COVERAGE

New Progress Line Units Are Assigned Exclusively to Long-range Duty

After replacing many of its 100 mobile radio units with new General Electric Progress Line units, New Jersey Power & Light Company learned that the new G-E units perform so well that they are now assigned to the trucks that operate farthest from their base stations.

Get Greater Range and Better Reception

In addition to the excellent range of operation provided by the new General Electric units, Harold Mann, communications engineer, is enthusiastic about the high-fidelity quality of messages from mobile units. This, he explained, is due largely to the controlled reluctance microphones supplied with all Progress Line mobile units.

The utility's radio system includes 10 base stations throughout the northern half of New Jersey, 5 of which have 450-mc repeaters, and 100 low band 60-watt mobile units.

Maintenance of all New Jersey Power & Light Co. radio equipment is provided by the Warner Engineering Company, an authorized General Electric Service Station located in Upper Montclair, N. J.

The utility reports that its 10-year experience with radio has proven a maintenance contract with the General Electric Service Station is more economical than providing service through its own maintenance department, and is equally effective.

For Sales and Service...see "Radio Communication Equipment" in your yellow pages. Or, write: General Electric Company, Communication Equipment, Section C2247-22, Electronics Park, Syracuse, New York. *In Canada:* C.G.E. Electronics, 830 Lansdowne Avenue, Toronto.

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